

THE AMERICAN LEVER CUFF AND COLLAR BUTTON

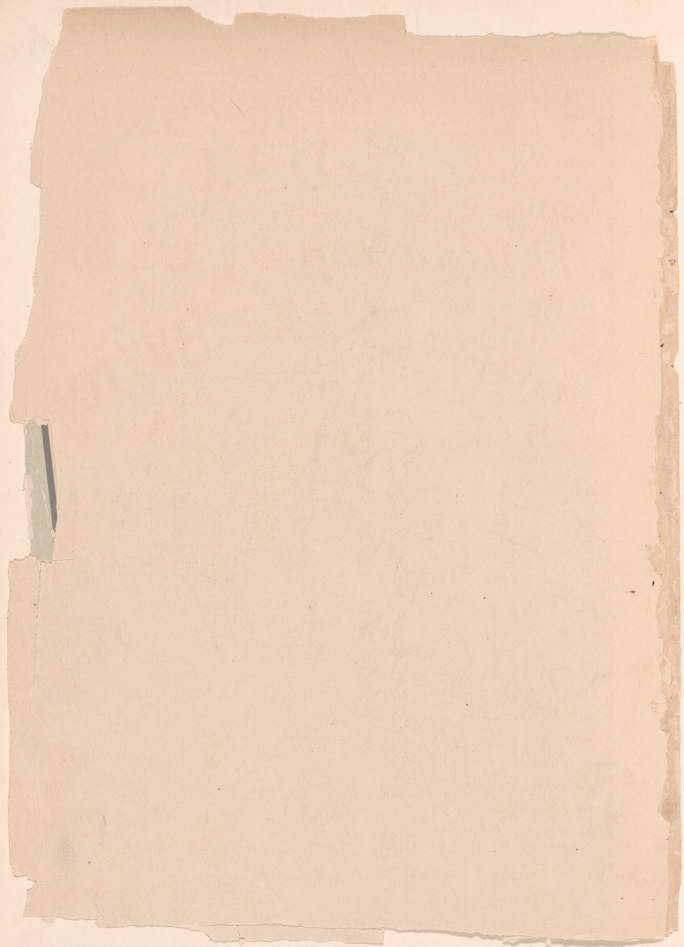


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Jewelers'
Japanese
Jewelry

VOLUME XII, 1895



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THE

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The Twelfth Volume of this Journal begins with the present number. Those of our readers whose term of subscription has expired, and who have been notified by our usual circular, will confer a favor by responding as promptly as possible, as all subscriptions terminating with the last volume will be discontinued if not renewed.

Prosperity of the Jewelry Trade.

THE unusually large amount of goods sold during the holidays fittingly brought to a close a year of remarkable prosperity in the jewelry trade—remarkable, because the amount of goods disposed of was large, and because so large a volume of business was anticipated only by the most sanguine. Goods of all kinds were in active demand during the past year, but those of standard quality were especially sought for. Manufacturers of artistic goods, combining rare genius and the highest order of workmanship, found themselves busily employed, and unable to keep up with their orders. Never before in the history of the country have so many diamonds and other precious stones been sold in an equal space of time as during the past year. Gems of exceptional beauty brought fabulous prices, while those less valuable were eagerly sought for. This growing demand for fine goods and precious stones is evidence that the American taste for art work in jewelry is rapidly improving, a fact largely due to the facility with which our people can visit the older nations, and enrich their minds and elevate their tastes by the study of art in the homes of the old masters. Americans are generous buyers, and as wealth becomes more generally distributed among them, they indulge their tastes without stint. Our manufacturers keep fully abreast of them in liberality, and lose no opportunity to exhibit to them goods worthy of their appreciation. By frequent visits to Europe, they keep informed of what is being done there in the production of new styles,

and they come home full of ideas which they proceed to work out with that ingenuity for which Americans are noted. As a consequence, their finer productions mean something—they are not only works of art, mechanically wrought out with great skill, but they are poems—telling some classic story, or presenting to the eye a vision of past grandeur. These artistic productions are wrought out in servicable form, for your Yankee workman is nothing if not practical. His soul may be filled with romance and sentiment, but the work of his hands it always something practical. England, Spain and France have earned reputations, each in her own way, for transferring grand ideas to wrought gold and silver, putting them in forms to be looked at and admired, but the American workman would think his labor lost if he did not combine with his dream or his poem some element of practicality. Hence, there is no market in the world where useful forms of jewelry take on such chaste and elegant designs, such richness of material and workmanship, as in America. Europe is ravaged for ideas and for gems to ornament the persons of our exacting and critical Americans.

The trade is greatly to be congratulated on the improved taste of our home buyers, and for their appreciation of the pure in style and design. A short time ago almost anything that was costly would sell, and, as a consequence, there was frequently a jumbling together of styles—Roman, Etruscan, Chinese and Japanese—that was execrably painful to a cultivated taste. Now, however, the demand is for something entirely different, neat, ornamental, tasteful but not gaudy. The standard quality must be maintained, but the style is more severe, more simple. The demand for gaudy jewelry, born of our "shoddy" aristocracy, so called, has given place to a demand for goods more in keeping with the more cultivated tastes of our present wealthy classes.

As we have said, there has been an unusual call for diamonds, but other precious stones have not been overlooked. Rubies have been actively called for, but as speculators abroad have made a "corner" in rubies, the demand could be but partly supplied. Sapphires are also much sought after, but are also scarce. A good, full colored sapphire is now more valuable than a diamond of equal weight, and some choice specimens have recently been sold at fabulously high prices. A fancy has lately sprung up for jewelry made of small seed pearls, and some exquisite examples have been produced by our manufacturers. Indeed, the producers of artistic specialties in jewelry have had their hands full to keep up with the demand for novelties in rich goods with unique styles. But all special forms of jewelry have their day, and that which is all the rage this year may be out of style next. We are a young, growing, pushing, bustling people, and have little veneration for age, and no respect for relics. Everything must be fresh and in the fashion. A fashionable American lady, no matter how rare and rich her collection of jewelry and precious stones, will no more wear jewelry that is *passed* than she will wear last year's bonnet. Consequently, our manufacturers are constantly called upon to change the settings of valuable stones, and to supersede the old style with the latest fashion. Quite a number of manufacturers do a very nice business of this kind, and find it profitable. In Europe the reverse of this is true, and jewelry that was worn a century or two ago is more highly prized than the modern styles. It is to be re-

gretted that the same is not true here, for much of the wrought gold and silver of to-day is especially adapted, by reason of its quality and workmanship, to be preserved as heirlooms in families, to be worn and admired by generation after generation.

There has also been an unprecedented demand for American watches, open faced cases having the preference, and there is not one of our manufacturers that has been able to keep anywhere near his orders. All are behind and have been throughout the year. The foreign demand for these goods has been something wonderful, equal to from 30 to 40 per cent. of the production. It would be thought that manufacturers of watches would be content to go along as they are, and supply the demand as rapidly as possible, but they are not. On the contrary, they are constantly bringing out new movements, something a little better than they had before, or a movement that they can sell for less money. The trade demand for cases and watch chains has also been very active, and new styles of both have formed a prominent feature of the trade. In bangles there has seemed to be no limit to the demand, one manufacturer alone having sold 5,000 pairs within four months. There was great variety in the designs presented, and purchasers could not fail to be satisfied.

While the traffic in fine goods has been exceptionally active, the cheaper grades have been by no means neglected. Manufacturers of plated goods have had about all they could do to fill their orders, and they have, also, shown great enterprise and much originality in producing elegant and desirable designs. Imitations in plated goods of unique designs in fine goods, have, we are sorry to say, been exceedingly prolific. It is unfortunate that there cannot be a well-defined line of demarcation between the costly and cheap goods so far as designs are concerned, but we suppose this is impossible. If a design in fine goods proves attractive, the manufacturers of cheap goods are pretty sure to adopt it, and to crowd the market with it. When it becomes common, the sale of the better quality is ruined, and even those who have purchased become disgusted and anxious to dispose of what they have bought. This may be good for trade in general, but it is, nevertheless, unfair to the designers and manufacturers of the better grades of goods. The country trade generally shared in the prosperity enjoyed by the manufacturers and jobbers, and retail dealers in all sections had a prosperous season. There were fewer failures than usual, and the trade has been benefitted by the withdrawal of such of the weak and unreliable houses as were forced to the wall. With the general prosperity of the trade, irregular practices have been lessened, and active competition has served rather to strengthen, than otherwise, the better features of business. This indicates that these irregular practices of which we heard so much a year ago, are born of dull times, when orders are few, and unusual means are resorted to to control the trade. The retail trade entered upon the new year with a less amount of old stock to carry over than usual, and with brighter prospects ahead than ever before. Such few dealers as are encumbered with old stock, we advise to sell off as soon as possible at any price. When trade is "booming" is a good time to educate buyers to an appreciation of better styles, and this can only be done by keeping a full line of the freshest novelties. Clean out the old and make room for the new should be the motto of every retail dealer.

In looking back over the year just passed, the trade cannot fail to pay a tribute of respect to the dead 1880. It died and left the country more prosperous than many of us remember it ever to have been; the nation at peace; our granaries and warehouses overflowing with the products of the soil; business of all kinds unusually active; and the jewelry trade with everything to be thankful for. So closed the year, and 1881 enters, fresh and rosy, with brighter prospects for the future, for the year past has restored confidence among men, and no one can fix a limit to the prosperity now promised. That this is so, is largely due to those who have been at the head of the government; those public men who have so wisely administered our affairs that the national credit is above par in foreign lands, while an American citizen commands respect in every quarter of the globe.

An Interesting Legal Decision.

THE Supreme Court of Rhode Island recently rendered a decision in the case of Gardner vs. the Commercial Bank, relative to an assignment made by Sackett, Davis & Co., jewelers, of Providence, R. I., which is not only of great interest to business men, but results in the attachment by creditors of the estate of the firm. Briefly stated, the case is this: In 1878, the firm of Sackett, Davis & Co., by reason of real estate investments, became embarrassed, and made an assignment, claiming that the liabilities, while large, were much less than the assets, but that the assets were not immediately available. In executing the assignment, it was stipulated that the assignee might carry on the business, reinvest the property, contract debts, and do whatever was thought best in the interests of the creditors. While this was apparently in the interests of the creditors, it was really to delay proceedings in order that the estate might become more valuable, and something be saved to the assignors. Some of the creditors maintained that such an assignment was not valid, and attached some of the property. Thereupon Sackett, Davis & Co. made a new assignment to cover the mooted points, and it was claimed, that this second assignment annulled the attachments already levied. Under this condition of things, two questions were presented to the Court, viz., first, was the first assignment valid; second, if it was not valid, did the second annul the attachments. The Court decided both questions in the negative. The Court reasoned that while it was permissible to frame an assignment in the best interests of the creditors, that may delay their payment somewhat, it is not admissible to frame one in the interests of the assignor, to save as much of his property as possible for his benefit. In short, that an assignee has no right to delay payment of creditors in order to prevent a shrinkage in value of the property. Otherwise creditors might be forced to make further advances to protect the property, which they would only do under compulsion. The argument of the Court was to the effect that the estate of the assignor belongs to the creditors, and that the assignee is bound to consider them only, and not the assignor. On the second point, the Court held that as the first assignment was void, the second could not operate to annul attachments placed on the property. The decision is an important one, and will have a bearing on many insolvent estates.

Upon the rendering of this decision, creditors at once placed attachments on all the property that could be found, the aggregate sum of the attachments being about \$210,000. Sackett, Davis & Co. were holders of real estate in Providence and elsewhere to large amounts. This was unavailable during the hard times for the payment of their debts, and these investments are regarded as the cause of all their trouble. The property, if it could be held and sold to advantage would ultimately, no doubt, bring more than the firm's indebtedness, but as it is now to be sold on a low real estate market, it is doubtful if the creditors realize the full amount of their claims. The firm of Sackett, Davis & Co. used to be well known and enterprising, and its downfall is attributed to real estate speculations, furnishing another illustration of the danger attending speculative investments by business men.

The Jobbing Trade in Chicago.

FEW persons who have not visited Chicago can comprehend the vast amount of business of all kinds transacted in that great city of the West. It is most happily located, the center of railroad traffic, and is the key of the great agricultural regions of the West and Northwest. As the country still further develops, Chicago cannot fail to increase in size and importance, for the West is, unquestionably, to be the future theatre of the great enterprises with which the active American mind is now busy. In all branches of trade and commerce, Chicago men have shown great activity and capacity, and in none has their enterprise been more pronounced than in the jewelry jobbing trade. There are located some of the finest and most extensive jewelry palaces to be found anywhere, stocked with immense supplies of goods unexcelled for beauty and quality. These

goods are mainly manufactured in the East or imported, Chicago not having entered upon the manufacture of jewelry to any great extent. Indeed, it is scarcely probable that she ever will, for the established manufacturing facilities of the east are superior to any she can offer. But it is as a great distributing center that Chicago gains her importance in the trade. That city is a thousand miles nearer the great pioneer army of retail dealers that has pushed its way to the frontier, and grown up and expanded as the country has been converted into towns, and towns into villages and cities. These retail dealers can obtain their supplies much more readily from Chicago than from the Eastern manufacturing centers, and the Chicago trade has wisely preferred the jobbing to the manufacturing branch of the business. It is better they should continue to do so, for, with the small margin of profit now in the manufacture of goods, they would not be warranted in investing the large sums required to plant manufacturing establishments. In handling the immense quantities of goods of Eastern manufacture that they now do, they virtually bring the factories to the doors of the retailers, and afford them every facility that it is possible for them to have.

The retail trade is the foundation whence flows all prosperity that comes to the trade. It is the retail dealer who comes in immediate contact with the consumers, studies their wants, and who educates the masses to an appreciation of art in jewelry. From them the jobbers and manufacturers learn what styles of goods are salable and what are not, and the probable demand for each style. The retailer is the keystone of the arch of the jewelry trade. The jobbers who established themselves so numerously in Chicago have done well to cater to the retail dealers, taking their orders at first hand, and thus exercising an immense influence upon the producing branch. We are glad to learn that the jobbers of Chicago have participated in the general prosperity of the country, and that their sales during the past few months have never been exceeded. They have certainly been most liberal in their orders, and we trust they have found their profit fully equal to their anticipations. A more enterprising, pushing, *live* set of men than the Chicago jobbers in jewelry, it would be difficult to find.

Bankruptcy.

PROPOS of the discussion of a new national bankruptcy law, which is now springing up again, as it is wont to do before each assembling of Congress, it may be remarked that the spirit of our former law is like the English, and very different from the European statutes. The English and American laws treat bankruptcy as a misfortune, and the European (excepting the Russian) rather as a crime. Without expressing any opinion as to which is the correct theory, it may be remarked that while there was a general agreement that English and American laws were unendurable, the European laws seem to give rise to no such general complaint. The French commercial code largely serves as a basis for the law in Denmark, Italy, Sweden, and, indeed, a greater part of the Continent, and it will, therefore, be interesting to glance at its leading features. The principle of the French law is that a failure is *prima facie* the result of fraud, rather than of misfortune, and when a trader becomes insolvent a case is thereby made out against him, and he must clear himself of the imputation which he has brought on himself. Simple and fraudulent bankruptcy are, nevertheless, carefully distinguished, but both are punishable, and in neither case is a composition with creditors permitted. A fraudulent bankrupt is one who conceals his assets, or destroys his books, or falsifies his accounts. But it is in regard to simple bankruptcy that the law is chiefly remarkable. For the purpose of protecting creditors the law permits that the bankrupt's whole life shall be inquired into, and he is condemned—that seems to be the proper word—if his personal expenses or the expenses of his household are extravagant; or if he has lost large sums by gambling in stocks or goods; or if he makes what are called "preferences" between creditors under our laws; or if he imprudently incurs large debts on another's account without exacting security for himself; or

if he fails a second time without fulfilling the conditions on which he was permitted to trade again; or if his accounts are even carelessly kept, there being no imputation of specific fraud, &c. The penalty, under the Danish law, for fraudulent or negligent bankrupts is imprisonment, without the alternative of a fine, for from a month to six years, and the Judge may impose hard labor or a diet of bread and water at his discretion. The Swedish law is still more strict; two months' imprisonment is the minimum, and the insolvent is deprived of his rights as a citizen. However harsh and inquisitorial these laws may seem to those who suffer from them, those who lose by such sufferers' acts will deem the penalty no more than is deserved by those who deal carelessly or rashly with their neighbor's goods, or who go staggering along to worse disaster under a load of obligations which they know they cannot fulfill.

Bogus Watch Material.

WATCHMAKERS are making serious complaints regarding spurious watch material, that has been thrown upon the market of late, and which seriously interferes with their work. This material consists of parts of watches made in imitation of American made material, but of inferior metal. Some of it is soft almost as lead, while other parts are hard and brittle, none of it being evenly tempered. It is made abroad, and is of such inferior quality and workmanship, that the watchmakers who have been victimized by buying it, lose much valuable time in fitting it, and after they have done so it is apt to inflict permanent injury upon the watch, and materially interfere with its time keeping qualities. The persons who make the stuff, turn out this inferior material in quantities especially for the American market, and jobbers who are in the habit of supplying watchmakers with watch material, should be on their guard against being imposed upon. Our manufacturers all make duplicate parts to supply the trade, which are the exact counterparts of the material used in the respective grades of movements. To make sure of getting trustworthy material, jobbers should order direct from the companies. Workmen who are not sure of getting from the jobber the material desired, by sending on broken or injured parts direct to the makers of the movement, exact duplicates can be furnished, which will cost but a trifle more than the inferior material and will save the watchmaker a great amount of labor in fitting.

A Scientist in the Trade.

MR. GEORGE D. SMITH, who died at Cambridge, Mass., a few months since, was born in Saco, Me., in 1833. After leaving school he passed some years in the jewelry store of Messrs. Twombly & Smith (of which firm Mr. Smith's father was a member), completing his trade as a watchmaker. After leaving their employ he resided a short time in Wheeling, Va., and Quincy, Ill., going from the latter place to St. Louis, where he remained for some years. In 1861 he went to Boston, and entered the store of Messrs. Palmer, Bachelder & Co., and in 1865 became a member of the firm, from which he retired at the end of 1878, but still remained with Messrs. Palmer, Bachelder & Co. until the time of his death. Some two years ago he had a slight paralytic shock, from which he never fully recovered, and which was, without doubt, the remote cause of his death. At an early age Mr. Smith became a devoted lover of natural history science, devoting all his leisure hours to his collection of insects. At the time of his death he possessed probably the largest private collection of coleoptera in New England, and one of the largest in the United States. His collection consists of more than five thousand species of coleoptera from America, north of Mexico and the central countries; and about three thousand from South America.

Mr. Smith was thoroughly devoted to the interests of the firm of which he was so long a member, and particularly throughout the wholesale watch and jewelry business in New England will he be sadly missed by those with whom he came almost weekly in contact, and whose friendship and confidence he possessed to the fullest extent. Mr. Smith leaves a wife and three children, to mourn his early decease.

the deposit of \$100,000 from certain associations, which we believed was intended to end the existence of our own and all similar associations in our State. We were obliged to act promptly. A special meeting was called and a committee was appointed to attend a meeting composed of the representatives from the various associations of our kind. A representative was sent to Albany. The bill was defeated.

An Association has since been formed under the name of "The Union of the Mutual Benefit Associations of the State of New York," and composed of two delegates from each Society in the State, with the object of mutual benefit and protection. Two members of your committee were appointed to represent you.

Your committee have held during the year twelve regular meetings, a quorum being present at each. They have also held four special meetings.

We began the year with a membership of 561. We now number 1,040 active members.

The average age of the membership at the last annual meeting was 37.95. The average at this meeting is 36.98.

Amendments to the Constitution suggesting the establishment of a permanent fund, by providing for the reception and care of gifts and bequests to the League, have been presented to your Committee, and will be placed before you, for your consideration at the proper time during this meeting.

At a meeting of your committee, held January 6th, in accordance with the action taken at the last annual meeting, it was ordered that—On and after May 1st, all applicants for membership residing or doing business in New York City or Brooklyn, shall be required to be examined by the Surgeon of the League. Your committee recommend that the *By-Laws* of the League be altered to correspond with this action.

To the active exertions of a small proportion of its members, the League is indebted for the accession to its numbers.

Exclusive of your committee, the record is as follows: 189 members have recommended from one to two members each.

The following from three to five each: Samuel W. Saxton, T. W. Manchester, Horace C. Hardy, C. Van de Sande, J. D. Yerrington, James B. Rich, Dyer Brainerd, T. L. Parker, E. T. Sturtevant, Aug. K. Sloan, Chas. Holyland, Emil F. Kipper, John F. Simmons, Herman Baum, T. B. Gilbert, A. S. Gardner, C. H. Miller, Henry E. Ide, Geo. W. Street, J. B. Bowden, F. H. Larter, C. F. Harden, E. F. W. Eisenmann, E. A. Hoizer, S. E. Fisher, Wm. C. Hodge, G. H. Kuchel, J. Louis Tenner, Webster C. Ball, Chas. Wilfong, James A. Smith, James T. Scott, Jr., O. C. Hansen, Albert N. Bliss, Sol. Bauman, C. V. A. Thompson, Willis H. Howes, W. J. Erce, Edith C. Hise, Leon Nordman, R. A. Thompson, S. M. Miller, C. Offmann, E. L. Vogt, J. T. Howard, Jr., C. E. Righter, H. Cockshaw, J. J. Heiser, Jos. Nordman, A. S. Mathey, S. Kaiser, G. W. Reynolds, Jr.

The following have recommended from six to ten each: William B. Kerr, Chas. G. Alfred, Philo W. Scofield, Stephen G. Walsley, Robt. F. Forrester, G. Villenain, Edw. G. Bogert, Stephen P. Cox, R. E. Burdick, Levi Stevens, Jr., A. Kurtzebaum, Bradford H. Knapp.

The following from eleven to fifteen each: Stedman H. Hale, Fred. D. Steck, D. H. Hopkinson, Wm. F. Cory.

Mr. Hayward S. Cozzens has recommended twenty-seven members. Mr. Caleb Clapp has recommended thirty members. Mr. Joseph R. Richards, of the Chicago Advisory Board, leads the list, having recommended during the year fifty-three members.

These are the stalwarts who have worked with us, and we thank them, every one of them.

One word to the large delegation who have not had the opportunity or the disposition to increase our numbers.

Gentlemen: You that have repaid without tiring, if you will each recommend one member during the coming year, our limit of 2,500 will be reached. Let us all strive for that result.

In conclusion, your committee return to you hands the trust committed to them. They have fully appreciated the confidence placed in them and the honor bestowed upon them. Their labor has been one of love and of pride. They are satisfied with the results if they meet with your approval.

The Past of the Jewelers League, with but few sad memories, is full of pleasant recollections; its future, fixed upon a solid basis, is bright with promises of hope.

Respectfully submitted,

A. K. SLOAN, (Ex-officio), JAS. P. SNOW, W. C. KIMBALL,
G. T. WOGLOM, JOHN D. LYON, GEO. W. SHIELDER,
ROBERT A. JOHNSON, Chairman.

New York, January 18th, 1881.

The reading of communications having been announced in order, without response, and the President stating that miscellaneous business was next in order, Mr. Gilbert T. Woglom arose and addressed the meeting as follows:

MR. CHAIRMAN—Following the information given in the report of the Executive Committee, I would move to amend, or, rather, before offering the motion to amend, which would require thirty days' notice, I would ask the unanimous consent of the meeting to order an amendment:

To insert certain words after the words "at his own expense," in Article I, Section 2, of the By-Laws, which section reads as follows:

"Every applicant is required to pass a medical examination at his own expense, and all persons applying for re-attestation, shall pay all arrearages, and be subject to a new medical examination at their own expense, and the fee, when the applicant is examined by the regular examining surgeon of the League, shall be two dollars." The amendment as proposed to be offered, if the unanimous consent of the members is granted, will make the section read:

"Every applicant is required to pass a medical examination at his own expense."

Full stop. Then to be followed with the words "All applicants who reside in, or whose business is in, New York City or Brooklyn, shall be required to be examined by the surgeon of the League." And then the section continues as at present. This is merely carrying out the decision of the Executive Committee in compliance with a motion made at the last annual meeting, that they inquire into the advisability of making this change. With these explanations, I offer the motion that the unanimous consent of the members present be granted to offer this amendment.

The motion was seconded, and upon being put, received a unanimous vote in the affirmative.

Mr. Woglom then formally presented the written amendment, which read as follows: Amendment Section 2, Article 1, By-Laws: By inserting after the words "at his own expense," the words "all applicants who reside in, or whose business is in, New York City or Brooklyn, shall be required to be examined by the Surgeon of the League." The amendment was adopted.

Mr. Woglom continued: "Mr. Chairman, the report of the Executive Committee mentions proposed amendments to the Constitution and By-Laws, of which due notice has been given, and they will be introduced at the proper time. I therefore would submit the following to the Jewelers' League, and in offering it, would state that I do it in my individual capacity, simply as a member of the League.

To the Executive Committee of the Jewelers' League:

I submit the following proposed revisions and amendments to the Constitution and By-Laws of the League:

1. To revise Article IV, Section 2, by inserting after the word "Treasure" the words "and of the securities and investments of the permanent fund in the keeping of the Executive Committee."

2. To revise Article V, Section 1, of the By-Laws, by inserting after the word "moneys," in parenthesis the words "(other than from the sources mentioned in Article XI, Section 2, of the Constitution.)"

3. To amend the Constitution by adding the following, which shall constitute Sections 2 and 3 respectively, of Article XI, of the Constitution, viz., Section 2. Any or all pecuniary bequests, legacies or gifts, which may be made to the League, if not otherwise provided for or directed by the donor or donors, shall be invested by the Treasurer in United States Government, New York State, New York City, or New York County Bonds, at the option of and under the direction of the Executive Committee, and as a fiduciary Committee the said Executive Committee shall provide a place for the safe keeping of such bonds, and shall exhibit them to the Examining Finance Committee in accordance with Article IV, Section 2, of the Constitution. Only by the unanimous consent in writing, by the full Board of Officers, viz., the President, the Vice Presidents, the Executive Committee and the Treasurer, may such bequests, legacies or gifts be invested in any other manner than as hereinbefore specified.

Section 3. Such bequests, legacies or gifts so invested, shall constitute a permanent fund of which the interest only, as it accrues and is paid, shall be transferred to the death-loss fund to be used as provided in Article VI, Section 3 of the Constitution.

Respectfully submitted,

G. T. WOGLOM.

Mr. Woglom then went on to say that the purpose of these motions and amendments was to provide for the reception and care of such gifts or legacies as may be made, from time to time, by living or deceased members. He saw there were a great many wealthy members in the League who would undoubtedly take great pleasure in making the League gifts at their death. It might appear unnecessary to offer such amendments as those submitted by him, inasmuch as no bequests had yet been made, but he thought it was a good idea to provide the cage before they got the bird; the bare fact of having the cage was sometimes an invitation for somebody to give the bird.

Mr. Woglom's motion to amend the Constitution and By-Laws, as explained above, was seconded.

By request of Mr. David Dodd, Mr. Woglom read the articles which he had proposed to amend, together with the proposed amendments, giving their coherence.

Mr. Dodd moved to amend by striking out the paragraph which permitted the full board of officers by their unanimous consent to invest in any manner other than as limited in the preceding paragraph.

Considerable debate was had as to the disposition of the amendments.

Mr. Archison moved that they be referred to the Executive Committee and reported on at the next annual meeting.

Mr. Dominick thought that an amendment could only be considered at meetings by unanimous consent, and, therefore, these particular amendments were out of order. The Secretary, however, informed him that thirty days' notice having been given it was proper to consider the question; and Mr. Woglom read a Section of the By-Laws, and showed that the By-Laws had already been complied with.

Mr. Dodd's amendment was put and carried.

Mr. Atchison made a motion, which was seconded, that the original motion to amend be laid on the table. The motion was lost.

The original motion of Mr. Woglom to amend was then carried as amended by the motion of Mr. Dodd, striking out the paragraph referred to.

The Secretary called the attention of the members to a number of designs for a badge for the League, which he had brought with him. He stated that during the year the Executive Committee had received a great many communications in regard to providing a device indicating membership, and out of deference to those who had inquired, the Committee had instructed him to bring designs with him. The members could inspect these designs in the course of the evening, and decide upon one.

Upon Mr. Dodd suggesting that the body should be made of nothing less than eighteen carat gold, a member facetiously inquired who would make them, which sadly created no little merriment.

Mr. Woglom here addressed the meeting again, saying it was his intention to offer a resolution for the appointment of a special committee of five, which should serve a two-fold purpose: one, to provide for what was set forth in the resolution, and the other to provide against the contingency of the League being interfered with by hostile legislation. He then read the following resolution.

Resolved, That a special committee of five be appointed who shall, in furtherance of the objects of the League as shown in Section 3, Article 1 of the Constitution, discuss the necessity of providing for its several members, or such as may desire it as a separate class, suitable payments during sickness or while incapacitated from attending to their business from sickness or accident, and which committee shall report the result of their deliberations at the next annual meeting, with such recommendations, if in the affirmative, as to the amendments necessary to be made to the Constitution and By-Laws, as they may seem proper.

The resolution, upon being put before the house, was lost.

The President announcing this recess was next in order, and it seeming to be the inclination of some to waive recess, a vote was taken, and it was finally decided to have an intermission of three minutes time.

After recess, the meeting proceeded to elect officers for the ensuing year. Messrs.

Henry J. King and Henry K. Dyer were appointed tellers.

Nominations for President declared in order, Mr. Isaac Mills nominated Mr. Augustus K. Sloan, of Carter, Sloan & Co. Mr. Hale seconded the motion, saying that he took great pleasure in doing so, knowing that he acted in accordance with the views of nearly ninety members from the city of Chicago.

Mr. Parker nominated Mr. Robert A. Johnson, and Mr. Thomas W. Manchester nominated Mr. Gilbert T. Woglom.

Mr. Johnson, rising with his usual grace and dignity, respectfully and decidedly declined the nomination, saying that he thought there was a remote possibility of his being elected, and a strong probability that he would not be.

The motion was made and carried that the meeting proceed to ballot for President. Upon the ballots being cast and counted the tellers found that there were 128 votes cast; 81 for Mr. Gilbert T. Woglom, 56 for Mr. Augustus K. Sloan, and 13 for Mr. Isaac Cole. Mr. Gilbert T. Woglom was declared elected, and upon motion, the election was made unanimous.

A discussion arose as to the election of Vice Presidents. The Constitution provides that the third and fourth Vice Presidents, after serving one year, shall be advanced to first and second Vice President respectively. But the third Vice Presidency having been made vacant during the year by the appointment of Mr. Sloan to the presidency, the question as to what should be done with the third Vice Presidency having arisen, it was voted to confirm the action of the Executive Committee in the appointing of Mr. Henry Hayes, of the firm of Messrs. Wheeler, Parsons & Hayes, to the third Vice Presidency; also voted to confirm Mr. Hayes in the position to which he was advanced, of first Vice President.

Mr. Samuel W. Saxton, of Messrs. Saxton, Smith & Co., fourth Vice President, was advanced to the office of second Vice President.

Mr. Siedman H. Hale, with Robbins & Appleton, Chicago, and George H. Richards, Jr., of Boston, were unanimously elected third and fourth Vice Presidents respectively.

Mr. William L. Sexton, of Messrs. Sexton & Cole, having been nominated for Secretary and Treasurer, and there being no opposing nomination, on motion Mr. King was appointed to cast one ballot for Secretary and Treasurer, and upon his doing so, the Chairman announced the unanimous election of Mr. William L. Sexton to that combined office. On the announcement of the vote Mr. Saxton received quite an ovation of applause. Upon being urgently called to respond, Mr. Saxton warmly thanked the members for the confidence and esteem which they manifested in re-electing him. He accepted the office with great reluctance, the duties being very arduous and occupying much time, but having the interest of the League at heart, he felt called upon to serve them again, upon this unanimous re-election.

Upon motion of Mr. King, a committee of two, composed of Messrs. Dodd and Hopkinson, was appointed to escort the President elect to the chair, and the other recently-elected officers to the platform. This was done with dispatch.

Four vacancies being declared in the Executive Committee, the following gentlemen were elected to fill them: William C. Kimball, with H. F. Barrows & Co.; Robert A. Johnson, of Colby & Johnson; George W. Shiebler, for the full term of

two years, and Stephen P. Cox, of Cox & Sedgwick, for one year, being the unexpired portion of the term of Mr. Woglom, the President elect.

President Woglom appointed as the Examining Finance Committee for the ensuing year, Messrs. D. H. Hopkinson, Bradford H. Knapp and Robert F. Forrester.

Upon motion of Mr. King, the same rules as were passed at the last meeting were adopted, as to the spreading of the minutes, the printing of the proceedings in pamphlet form, etc.

On motion of Mr. Dodd the thanks of the members were extended to the late officers of the League for the satisfactory manner in which they had performed their duties, and particularly to the able Secretary and Treasurer, whose popularity was evident from the manner in which his name had been received for re-election.

On motion the meeting then adjourned.

Since the above was in type, eight of the members mentioned in the annual report as having failed to pay assessments 3 and 4, have sent the amount to the Treasurer.

Obituary.

JAMES D. NELSON.

JAMES D. NELSON, the recently deceased member of the Jewelers' League, was a very promising young man, who completed his apprenticeship with, and who continued in the employ of Messrs. Woglom & Miller, manufacturing jewelers of this city, up to the time of the short illness which preceded his death. He was but 28 years of age, and resided on Jersey City Heights with his young and interesting family, consisting of wife and four children, the oldest of whom was but six years of age at the time of his decease. He was a loving, faithful father, who, looking brightly forward to a life of long continued usefulness, devoted himself to securing the present comfort of his little family, hardly dreaming that he might be cut off in his early manhood, but still sufficiently alert for their future to have taken a strong interest in and to have become a member of the League in its infancy, thus providing for them even after his "right hand had forgot its cunning."

He was an accomplished artisan, conscientious always in his determination to give full and properly finished work in return for his pay, earnest in his devotion to the interests of his employers, and therefore never had to seek elsewhere for employment. It is the men of his stamp who make the factory the peer of the counting room.

How Church Tower Clocks are Wound.

THE oldest tower clock in the city is in St. Paul's steeple. It was made in 1778 by John Thwait, of London. The clock in St. John's Church was put in the tower in 1812. The Trinity clock was placed in its lofty station, 200 feet from the pavement, in 1846, by James Rogers. In dry weather this clock runs well; but in damp, chilly weather it sometimes stops, owing to the precipitation of moisture on the wheels. Originally two men were required to wind it, each of the three 1,500 pound weights having to be lifted over 50 feet. Some time ago the winding gear was changed so that one man can now wind it.

Describing the operation of winding, the clock-keeper said, the other day: "The crank is about 20 inches long, and when I turn it around I make a sweep of 30 inches. Its a good deal harder than turning a grindstone, but the machine has a ratchet, so that I can stop and rest when I want to. The crank has to be turned 750 times to turn the barrel 21 times. Around the barrel is wound the wire rope that holds the 1,500 pound weight. The weight is simply a box with pieces of iron in it. That is very old-fashioned. Now we have iron weights so moulded that they can be added to or subtracted from, and the weight can be graded to a nicety. A new wire rope was put to the chimes weight the other day. The rope is what is called the tiller rope, and is 280 feet long and three-quarters of an inch thick. It takes me an hour and a half to wind up the clock."

St. Paul's clock has a single back gear and two weights of 1,000 pounds each. It takes three-quarters of an hour to wind it. St. John's clock is wound in less than an hour; while the modern clock of St. George's, in charge of the same keeper, is wound in fifteen minutes.

A Costly Piece of Art.

THERE has just been exhibited and sold in Paris one of the rarest and most beautiful of the smaller art treasures of the world, a delicately patinated, bronze reduction of the Greek prototype of the Roman "Spinario," known also as "Le Tireur d'Épine," from which it differs in detail considerably. This statuette is probably a specimen of Greek art of the fourth century, and the figure as seated is nine and seven eighths inches in height. It was lately bought by the firm of Rollin & Feuardent, of Paris, where its exhibition created much sensation in the art world, and has been sold for 70,000 francs (\$14,000) to the Baron Edward de Rothschild, who carried it off, while the authorities of the Louvre were debating about buying it and those of the Berlin museum were anxious to secure it. In an article in *La Chronique des Arts* of the 18th ult. M. Adrien de Longperrier, a distinguished archaeologist and ex-conservateur of the antiquities at the Louvre, pitches into the present authorities for their hesitating policy in regard to the purchase of the work, of which he gives a highly appreciative account. We are able, however, to supplement his article by some facts as to the original discovery and owners of the statuette. Some fifteen years ago it was found at the Acropolis, on the site of Sparta, Laconia, and sold for a small sum to Mr. Merlín, English consul at Athens. While on a continental voyage, which included Greece, the present duke of St. Albans saw the work and bought it of Mr. Merlín, paying £200. One day some years after, in London, the duke brought it to Mr. Gaston L. Feuardent, then head of the London house of Rollin & Feuardent, and asked him what he would offer for it if he (the duke) were willing to sell. Mr. Feuardent, recognizing its value, promptly answered: "One thousand pounds." This offer was much higher than a previous one which had been made to the duke, who promised that when he did sell his statuette he would give the first choice to the house of Rollin & Feuardent, which we infer he has now done. Mr. Feuardent, who spent a day with Prof. Comyns Carr in admiration and examination of the statuette, says that it is truly an art-work of the highest merit. It shows, he says, the art of Greece proper, which is different from that of Magna Græcia. The latter in general is pleasing, graceful, but slightly effeminate if compared with pure Greek work.

The legendary story of the "Spinario" is as follows: A young shepherd, seeing the Latins enter in the night time the Roman territory, ran to the capital to tell the Senate. On the way he got a thorn in his foot, but did not stop. He endured the pain on his continued course, and, after having delivered his message, sat down to extract the thorn. The senate, in admiration of and to perpetuate his fame and patriotism, decreed that statues, representing him taking out the thorn, should be erected in his memory. The seated figure is that of a young man, the muscular indications on whose body show that he will become an athlete. As he bends forward to extract the thorn from his left foot, which rests on the right by the knee, the expression of his face, and the whole anticipatory shiver seen throughout his body, show that he knows it will be a painful operation, but that he is bent on going through with it. This particular statuette differs from the usual Roman type in that the right leg is extended and rests on the heel, the ground and the rock are longer, the youth's hair is short, and the whites of his eyes are of silver.

The story of the Louvre's loss of the work is stated as follows: M. Alexandre Dumas, who was one of the first to see it on its arrival in Paris, spoke of it to M. Turquet, the under secretary of state of fine arts, who, after he had seen the statuette, was in favor of its going to the Louvre. The firm who owned it, who had to pay well for their purchase, naturally wanted to make a good profit, but offered to make any terms that were agreeable as to payment. The Louvre authorities hesitated, for part of the sum would have to come out of the budget for this year. They asked for a reduction of price and decided when this was refused, to buy, but finally in the midst of all these *fourparters*, let the chances slip. M. Turquet even thought that some of the money should be discounted, which is to come from the museum fund from the sale of the crown jewels. Only the other day the Frankfort Rothschild carried off for 800,000 francs (\$160,000) the celebrated Jannitzer silver gilt cup, which was in the Germanic museum at Nuremberg, and now one of the Paris members of the family gets the best of the Louvre and the Berlin and British museums.

The Consumption of Gold and Silver.

THE Director of the Mint, in his annual report, states that the mines of the United States have produced the last seven years about \$280,000,000 of gold and \$271,500,000 of silver, an average production during that time of \$40,000,000 of gold and \$38,750,000 of silver per annum. Of this production about 95½ per cent. of the gold and 60¾ per cent. of the silver found its way to the Mints and Assay Offices to be converted into coin or bars. The Assay Office at New York reports that during the last seven years an average of \$3,333,333 in gold and \$3,500,000 in silver, has been paid in fine bars to manufacturers supplying them with the precious metals. These figures are merely approximate, and are much below the actual amounts employed. In order to obtain more accurate information relative to the final disposition of the domestic production, the Director of the Mint has endeavored to ascertain the amounts consumed in the arts and manufactures from the manufacturers themselves, and in his report for 1879 a table was published, and though incomplete, was satisfactory to the Director, and led him to continue his investigations. He consequently mailed upward of 7,300 circulars to all the manufacturers of jewelry, plate, foil, chemicals, and others consuming gold and silver. Many failed to reply, probably through indifference or from a desire not to disclose, even confidentially the details of their business. It is believed however, that the total returns approximate the actual amounts so used, nearer than any former estimate has. The total amounts reported were about \$8,500,000 in gold and \$3,500,000 in silver. Nearly \$2,500,000 of the gold, was United States coin, while only \$500,000 was in silver coin. This small amount of silver coin used, in proportion to the gold, which is probably somewhat understated, is accounted for by the fact that the intrinsic value of United States silver coin is nearly 10 per cent. less than its face value, while gold is the same in bullion or coin.

The manufacturers reported a consumption of about \$5,500,000 in fine gold bars and \$2,750,000 in silver bars, and over \$500,000 in gold and nearly silver \$250,000 in silver of old articles and foreign coin. Of those operating in gold 85 per cent. manufactured in jewelry and watches, 5 per cent. watch cases, 7 per cent. gold leaf and plated ware, and 3 per cent. chemicals and surgical and other instruments; and the reported amounts of gold consumed about 76 per cent. was used in jewelry, 14 per cent. in watch cases, 9 per cent. in gold leaf, and 1 per cent. in chemicals and instruments. Of silver 27 per cent. was used for watches and jewelry, 52 per cent. for watch cases, 17 per cent. for leaf and plated ware, and 4 per cent. for chemicals and instruments. In watches and jewelry 172 replies reported having manufactured and consumed in United States gold coin, \$2,000,000 and nearly \$4,000,000 in bars, more than \$500,000 in foreign coin and old manufactured articles, \$104,000 of United States coin \$777,000 in silver bars, and \$77,000 in old articles, making a total of gold and silver of nearly \$7,500,000.

The Director of the Mint, from careful consideration of all the data at his command, estimates that the amount of domestic bullion used in the arts and manufactures during the last fiscal year, was about \$5,500,000 of gold, and \$4,000,000 in silver, and that the total consumption in all forms was about \$10,000,000 in gold and \$5,000,000 in silver.

The old apprenticeship system is dying out in this country and even in Europe. There are many reasons for this, which would take much space to set forth in a logical way. Broadly, it may be stated that the progress of invention has been such as to make it a positive waste of time for a young man to expend seven years of his life in learning some routine processes and acquiring a measure of dexterity in handling certain tools. Too frequently an expert in some rule-of-thumb business finds that after all the time and trouble he has taken to learn what he does know, some machine or process is introduced which will make far more in an hour far more than he ever dreamed to produce in a day, and at a cost which staves him out of competition. Manufacturers are beginning to find a remedy for this by combining a rational study of a trade with an actual practice of it in their training of apprentices. By and by there will be a wider and more beneficial system introduced.

Distribution of Prizes to Watchmakers' Journeymen and Apprentices, in Paris.

WE translate from the *Revue Chronométrique*, of October, the following extracts of a speech made by M. Rodaset, the president of the *Chambre Syndicale d'Horlogerie*, at a distribution of prizes to journeymen and apprentices, in the Theatre du Chatelet, Paris. The occasion had called forth a great throng of visitors, estimated at upward of 3,000. At the appointed hour a large orchestra discoursed sweet music, the curtain rose, and the workmen who had received premiums were grouped about the stage, in company with the most notable watchmakers and members of the *Chambre*. When the last strains had died away, Mr. A. H. Rodanet mounted the tribune and pronounced the following

ORATION :

Ladies and Gentlemen—Your welcome appearance here to-day is to me both an assurance of the deep concern you take in our workmen, and a token of respect which you pay the *Chambre*, as the head and front of a numerous class of artisans, engaged in a very difficult and at the same time very useful pursuit. Exists there an art, the productions of which are in so general a use as those of horology? In all the manifold situations in life—whether it be when engaged at work, or in the pursuits of pleasure, or in business; or in travel—everywhere, we find that timepieces are indispensable. In their attractive forms, they are as well articles of ornament as of necessity. They adorn our dwellings, and are necessary fixtures in our great edifices. The chronometer enables the mariner to follow his course at sea in security—it is the right hand of the astronomer engaged in his observatory. Horology is an art which might well be termed a science, and it is necessary to be conversant with many sciences, and at the same time to be a very practical man, in order to be accounted an able watchmaker. (Applause.) This is the chief reason why an apprenticeship in our art must of necessity be long and difficult.

The Republic of 1789 made a clean sweep of all privileges, and broke the shackles which had until then fettered both trade and art. It brought us free labor, and prescribed our duties. We to-day enjoy free labor in the fullest meaning of the term; anyone may pursue that branch of industry he likes best; anyone may acquire and exercise a calling, and many here in this audience owe their social position and distinction to this liberty.

A study of the history of guilds, corporations and fraternities enables us best to fully comprehend the magnitude of the duties which we have assumed.

The mechanics' and professions' guilds are very old in France; we read of them as already existing under Roman dominion, when they were called *collegia*. The ancient Germans, during the epoch of migration of nations, brought the guilds, which stood under divine protection, to Gaul; while the institutions of antiquity, under Roman dominion, were founded upon the basis of master and servant, consequently upon serfdom, or slavery. The corporations of that age claimed to be free, by force of privileges, and uniting ancient and existing usages. How powerful they had become, may be gathered from the fact that Charlemagne was unable to abolish them, and his interdiction made through the Synod of Ruen, in 1189, remained a dead letter on the statute books.

The corporations formed unions with each other toward the 12th century, under the name of fraternities, without deeming the sanction of the state necessary, and placed themselves (in imitation of fraternizing bodies of antiquity, who sought the patronage of some hero) under the protection of some titular saint. Etienne Boileau, the president of the merchants' guild, under the reign of Louis IX., published his work on trades unions. He regulated the corporations by prescribing statutes, and fixed the amount of taxes to be paid by each; from that time forward labor was organized, both defensive and offensive. Courts and barons very quickly found out that money, in the shape of taxes, could be made by instituting such guilds, and

these "lords," through their greed, became the chief promoters, by furthering their organization.

King John created the office of Grand Chancellor, of whom the "king" of the merchants received his power, who, in turn, appointed the supervisors of weights and measures. Henry III. placed the trades unions under the immediate prerogative of the monarch; imposed a tax upon labor for his use, and abrogated several of the most notable abuses which had crept in. They leagued together, and the royal mandate was not obeyed. An edict of Henry IV., however, confirmed and supplemented it in 1597. Colbert increased the number of guilds in 1673, and gave them new statutes. Louis XIV. made them pay the salaries of a number of his officers.

A watchmakers' guild is not mentioned in the list under King John, in 1360. We first hear of it under Louis IX., who endowed it with statutes and regulations, and thenceforward the profession developed itself in a remarkable manner; already under the reign of Francis I. it attracted the attention of the public to a high degree, and it was deemed worthy to be placed under the immediate fostering care of the State, receiving additional confirmations from Henry II., Charles IX., Henry IV., and Louis XIV.

The number of watchmaker masters had at first been fixed at 60, but in the year 1733, Paris alone contained 180, who annually chose three supervising masters (*gardes-visiteurs*).

The time of apprenticeship was fixed at 8 years, and the masters could have only one apprentice during the time. The apprentice must be at least 10, and not over 16 years old. A salary or compensation did not exist, and the master had the right, in certain cases, to turn him over to a colleague. The apprentice was not free until he had accomplished the full term, and had given proof of his capacity. He then became journeyman, but was subjected to as strict and despotic rules as before. He was not permitted to change employers during three first years. He was forbidden from doing secret or piece work, under penalty of mulct of money, imprisonment, or corporeal punishment. Anyone who, prompted by a sense of independence, attempted to break through these barriers, was considered as an outlaw; house-owners were forbidden from renting him a domicile; the law prohibited everyone from furnishing him with means of subsistence or work, and the supervising masters had the right to apprehend him by help of the police.

You see, gentlemen, how galling the slavery of the laborer was, and what infamous means were used in order to keep him, of whose service the master throve, in subjection, and at the same time the price of his labor.

When he had accomplished the three years of journeymanship, in order to become master, he had to make his masterpiece. This was generally a strong watch—a repeater which struck the $\frac{3}{4}$ and whole hours, and had an alarm. He also had to pay a high license to the State.

Opposition then ceased. The young master could henceforth tyrannize over his former companions, and defend, as did his confreres, the monopoly of mastership in the most energetic manner. Strangers were, by principle, excluded from joining the guilds, and for this reason, Sully, who founded a watch factory under the protection of the regent, and whose labors were deemed worthy to serve as prototypes, by Pierre Leroy and Henri Sully, was not permitted to become a member of the watchmakers' guild.

Such arbitrary and senseless rules forced masters of the skill of Carus, Enderlin, Berthoud, and others, to be members of fraternities within whose pales only the densest ignorance and prejudice reigned supreme.

Ever anxious to suppress competition, in whatever shape or form, and to dole out the merest pittance to the craftsmen engaged in the calling, the masters obtained a royal edict, by which only the sons of masters or those who had served an apprenticeship in Paris, were admitted into their ranks. But the order worked decided mischief, and Jean Jodin, one of the best French watchmakers of the last century, pointed out the gradual decay of the art of horology from that

time forward. The principles pursued in the 18th century were not those which had actuated the masters of the Middle Age, and which had pushed the art to the front ranks. The aim of the guild was less directed toward improvement as toward supporting its ancient privileges, and the acquisition of new ones. It fought against all allied trades. Against the locksmiths, because they attempted to fasten the clocks in steeples; against the enamellers, because they made the dial plates; against the engravers, because they embellished the cases; against the leather workers, because they made the boxes; against the joiners, because they made the tasteful carvings; against the goldsmiths, who fabricated the gold watch and clock cases.

This state of things could not last long, because it stood in direct conflict with the interests of the public. Turgot abolished the guilds, and an edict of Louis XVI. attempted to introduce free competition—this was the first essay at freeing the workmen from the shackles which bound him, but it came ahead of its time. The opposition was too strong, and the authority of the king too weak; the order had to be recalled a few months afterward; it was reserved for the strong and mighty arm of the Revolution to wipe out old-fogism and let liberal ideas triumph. It forcibly abolished all guilds and fraternities, and the free labor was proclaimed throughout France, March 17, 1791.

Thenceforward labor was not deemed to be a crime; the industrial world, freed by the Revolution, could follow any branch of trade or art, and by its proceeds live and thrive. (Great applause.) Industry received a sudden impetus, and began to develop and perfect itself throughout all its branches with astonishing rapidity. One after the other centers of learning sprang up—the Academy of Arts and Trades, the Central School for Tradesmen, and many other special schools of instruction were organized to serve as means of popular education of the mechanic. The government, especially, took a great interest in the development and advancement of our art.

France possesses at present two schools which, on account of their intrinsic excellence and thorough appointment, deserve to be especially mentioned—one under the guidance of M. Benoit, an able and scientific master, is situated in Cluses, that mountainous district, where each cabin, up to the tops of the highest peaks, in close proximity to the eternal snows, shelter a family, every member of which is a watchmaker. The other school is directed by the intelligent M. Chopard, and located at Besançon—the most renowned center of horology in France.

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The oration of M. Rodanet closes with words of cheer and encouragement to the beginners, and we may recur to it at some future time.

Electric Clocks.

WE subjoin herewith a condensed translation of "An open letter to an enquirer," written by Prof. Dr. Meidinger, published *ad satietatem* in the *Allg. Uhrm. Ztg.*, Leipzig, Nov. 15, 1880, and since it tallies so well with the results obtained in this country, viz., that electric clocks are a "delusion and a snare," we hope the subject will be dropped from the repertory of our inventive American genius.

You ask our advice about the construction of an electric clock. We give it, and counsel you to leave the thing severely alone—have nothing to do with it. Do not uselessly waste labor, time, and money on the solution of a thankless, visionary problem. The conception for your intended mechanism is very fine; but, apart from the details of execution, the principles involved are not new; we predict, moreover, that you will share the fate of your predecessors, by failing to produce a timepiece of a continually exact rate, by simple means and at a cheap price, which may be sold with a certain remunerative margin, doubtlessly the ultimatum of your desires.

As is well known, two different mechanical constructions are designated by the term of "electric clocks"—different in impulse, although serving the same purpose. One designates telegraphic index works, connected and impelled by an electric conduit, supplied

from a standard pendulum clock at a distance, at certain stated intervals (generally one minute) which by means of its movement periodically generates and distributes an electric current through the entire circuit connected therewith, and thus moves the hands and controls the time of the index works. The French call them *compteurs électriques*. They may be seen in many places, in large edifices, schools, factories, and in the streets of several cities, to serve as unvarying timepieces. The principles involved are very simple, and the clocks answer their purpose tolerably.

Another system of clocks is embraced in the same term—the electric pendulum clocks, impelled and regulated by its self-generated impulse, and connected with an electric battery by a wire conduit. Even this is very simple in its details. The movement proper (comprising electro-magnet, wheelwork, and hands), is constructed like its brother, the *compteur*, only another set of wheels is added; it requires, besides, a regulator of its motion, and an apparatus for forming and breaking the electric current. The pendulum, of all other vibrating bodies has been found to be best adapted to serve the purpose of a regulator (only an occasional attempt was made to introduce a balance wheel). The oscillations of the pendulum, again, must be produced and sustained by electro-magnetic power, regularly, and must at least once each swing establish an electric contact. The manner in which this is effected, the power-producing the impulse of the pendulum, and the establishment of the contact, form the characteristic features of the electric pendulum clock. The French call them *horloges électriques* whether hanging, mantelpiece, or table clocks.

Electricity also is the agent which moves the hands and corrects the rate of the clock at intervals of one hour, more or less, by means of a contrivance acting upon the movement, whereby the hands are moved to correspond with those upon the standard. The first application to control the hands by electricity, was made by one Steinheil, in Munich, in 1859. Mr. Jones, an American, afterward invented a clock with an electrically influenced equi-oscillating pendulum, which by each swing corrected its time, corresponding to the rate of a standard clock.

Electric index works were invented simultaneously by Wheatstone and Bain, two Englishmen, in the year 1840, and have since been constructed on the same pattern, with only a few trifling modifications.

Electric pendulum clocks are not new. Mr. Bain, an Englishman, constructed one in 1844. The pendulum-bob was formed of an empty electric wire-coil, with vertical axis, and swung between two poles of steel a magnet, thus receiving its impulse; it established an electric contact at a certain point, and a current passed through the conduit. It had an escapement and ratchet, but the order was reversed—the former acted upon the latter and caused the motion of the hands. The current generated by the pendulum passed onward and controlled index works at a distance. Mr. Deane, also an Englishman, in 1847 built a similar movement, differing only in its pendulum-bob, which was an electro-magnet with horizontal axis. It was soon found, however, that these simple contrivances were no reliable timekeepers, since the electric current produced by the batteries of that day could not be maintained at one uniform strength, and the pendulum was thus exposed to the influence of other agents. A Frenchman, Liais, divined the cause of the defects produced by having the seat of electricity within the pendulum-bob, and removed the immediate action upon the latter by interposing an additional piece between them; he thereby obtained an even, uninterrupted impulse. His clock, made in 1851, had as a motor a spring, acted upon by an anchor. Other inventors employed a raised weight.

Thus arose the different systems of clocks; some possessed a weight, others a spring, which served as impulse. French mechanicians and watchmakers pursued this novel branch with great enthusiasm—Vérité, Froment, Houdin, Detouche, Garnier, Bréguet and others, executed works of very ingenious application, and exhibited them at the first Paris Exposition. Authors interested themselves and

wrote upon the subject. The writer of this resided at the time in Paris, and also took a deep interest in the matter. He purchased and took home with him to Heidelberg, a very handsome clock of Houdin & Detouche, which enabled him to invent his constant galvanic battery.

The future, however, soon gave way to sober second thought. It was found that Houdin's movement, with its constant spring motor, could only with difficulty be induced to go with a rate barely satisfactory. Other systems proved themselves to be no better, and authors, who had once with enthusiasm dilated upon the subject, published apologies.

The reasons why electric clocks never did and never will answer the purposes of thoroughly reliable timekeepers, are the following: Let us first examine the advantages sought to be obtained by their introduction: 1, simpler mechanism; 2, cheaper price; 3, greater closeness of rate; 4, less attention; none of which has been attained.

The construction of the movement is not simplified—on the contrary, it becomes more complicated. A new agent, the electro-magnet, is added, with which the watchmaker is unacquainted. Its preparation, manipulation, and use, offer increased difficulties compared to weight or spring. The intercalated piece between the arbor and pendulum, to preserve a uniform impulse, and the contact arrangement, are harder to understand than the escapement, and the few wheels requisite to convert the slow motion of the spring into a fast one in the escapement.

The electric clock cannot, therefore, be produced cheaper than our old time-honored one—it becomes more expensive. The mechanism of Houdin & Detouche cost in its time, without striking parts and battery, 100 frs. Good spring clocks, with striking parts could be purchased at the same time, at less than one-half the money. Their novelty, however, may have influenced the price also.

Spring and weight clocks are more reliable timekeepers. The electric specimen of Houdin & Detouche, belonging to the author, was best distinguished chiefly for its excessive inexactness of rate; the same was equally applicable to constructors on other principles. The insurmountable defect inherent to electric clocks of even the most perfect construction, lies in the contacts—in the metallic points, by the impingement of which the conduit is closed and a current is sent forward, or when it is broken again by their disconnecting. These points, even when made of the most noble metals, gold or platinum, soon oxidize, in consequence of the electric spark which, at the time of disconnection, springs from point to point; this oxide layer engendered becomes a non-conductor, the conduit is prevented from closing metallically, the current cannot pass freely. After a while the anchor is attracted more feebly; spring or weight are not regularly and duly affected; the index work is not propelled with sufficient energy, the clock loses time, and in due time stands still. The necessity arises to have it cleaned. These evils may to a certain extent be obviated by introducing a side contact, but they can never be radically removed. Krills' mercury contact is the most preferable of all others, but it is unsuitable for parlor clocks, and suffers to a certain extent with the same complaint. The contact also oxidizes in standard clocks, and will effect all index works controlled thereby, but as a connection is established only once a minute, they will keep their rate for a longer time, and their supervision is generally intrusted to an expert familiar with the peculiarities of electricity.

The reasons in favor of electric index clocks should be thoroughly investigated. This oxidation takes place even in bell-ringing mechanisms, but may be overcome by introducing the gliding contacts where the two metallic points slide over each other, and thus clean themselves by removing the layer of oxide through friction. Such an adaptation cannot be made use of in clocks; it demands additional power and produces an irregular going.

It will be seen by the above that the owner of an electric pendulum clock possesses a whimsical, notional instrument, upon which he cannot depend for more than a few days, or weeks at most; it

saves him the labor of winding up, but then begins to ail, and must be inspected. But who understands its possible repairs? The apparatus is beyond the ken of the watchmaker, and should he even soon master the principles of the not very complicated mechanism, he will nevertheless fail to diagnose the ailment which may as well have its seat in the battery as in the wheelwork; and thus he is placed at his wits' ends. A mechanician is not to be found everywhere, who at the same time is a telegrapher, and understands all about batteries. The vendor of such a clock will take good care not to accompany the article with a printed pamphlet, setting forth all possible ailments and mishaps, how, when, or where repairs are to be made, &c., for fear of frightening the purchaser, who, under these circumstances, would not have the thing on any consideration whatever.

Next, let us imagine all parts of such a clock in perfect working order, and it only needs to be set in motion. The battery claims our first attention; it must be composed in right proportions and evenly fed and sustained—directions for use are all important. Only the expert knows how the amateur manages these things. If the directions are too long and exhaustive they will not be read; the simple effort of a little study is already too much for the average man; if too short and in the brevity of a recipe, the several specified duties will receive no attention. Best of all, fetch the mechanician or telegraphic expert. Some systems of batteries will remain in working order for a year, but who knows the exact time when they must be renewed? And the first reminder the owner has of his forgetfulness is the standing still of his clock. The question now occurs, "Is it the fault of the battery or of the mechanism?" Several days pass until everything moves "in the even tenor of its ways." It would be well to hire somebody to attend to it, if the renewal were to take place at certain stated periods, but where three, six, or nine months elapse, the servant will prove himself as forgetful as the master, and the clock itself will be the prompter.

The battery must be placed somewhere. If the clock is to stand upon a little closet, there is no difficulty of locating it within. Otherwise, however, when it is to be suspended against the wall, or placed upon a table or mantelpiece, what is to be done with the battery? The wire conduit must be trained on the wall—and it is not a handsome ornament—must be protected against any possible damage. If the hands of the clock require setting, the wires must be unscrewed. If the little closet containing the battery is accidentally shaken, this will splash over, and stain carpets, furniture, &c.; if to be removed, it must be disconnected and taken out. All these are considerations which do not exist at first for the enthusiast, which will come to him little by little, but they will deter the thinking mind from burthening himself with such a thing of difficulties.

What grievances can be stated against the common clock? It is wound up daily, weekly, monthly, according to its construction. The pendulum-bob is moved up or down, until it goes right; its hands are moved backward or forward, as circumstances require. Can these operations be called difficult? They are trifling labors which everybody may perform, which may be entrusted to a child, and cost neither time, money, nor are they complicated in their nature. And if the clock will not go to one's satisfaction, it is sent to the ubiquitous watchmaker, who soon restores it to its "pristine beauty."

Enough. The common mechanical contrivance answers all our necessities, uses, and purposes; no need whatever exists to move the perfect mechanism of the present day by any other impulse than the customary one of weight or spring.

Electricity is an admirable agent where effects are wanted which can be accomplished by no other means, only by itself—telegraphy, galvanic illumination, &c.; the few drawbacks which are inseparably connected with it cannot for a moment enter into consideration. Where, however, equal and better results are obtained by agents far more tractable and simple, electricity becomes merely a luxury and a curiosity. To sum up, the electric pendulum clock will be found to be an engaging, but very soon satiating toy.

Fourth Annual Banquet of the Chicago Jewelers' Association.

THE annual banquet of the Chicago Jewelers' Association was given at the Palmer House on the evening of January 6. There was a large attendance of members and guests, and "the feast of reason and flow of soul" was greatly enjoyed by all present. The tables were formed in a hollow square, and were beautifully ornamented with evergreens and floral decorations. An excellent band of music conveniently placed added to the charm of the occasion. The President of the Association, H. F. Hahn, of H. F. Hahn & Co., presided, and there were seated at the table the following named gentlemen: E. P. Whitehead and J. M. Cutter, of the Elgin National Watch Company; R. Hart, of H. F. Hahn & Co.; N. Matson, L. J. Norton, and S. M. Perry, of N. Matson & Co.; Paul Jurgens and S. Anderson, of Jurgens & Anderson; Otto Young, of Otto Young & Co.; H. M. Carle, of Dueber Watch Case Company; Benjamin Allen, of B. Allen & Co.; S. H. Hale and M. A. Mead, with Robbins & Appleton; Peter Lapp and L. W. Flershem, of Lapp and Flershem; W. F. Tompkins, of the Seth Thomas Clock Company; Theodore Kearney and Samuel Swarthchild, of Kearney & Swarthchild; H. S. Peck, of the Waterbury Clock Company; C. H. Knights and W. H. Gleason, of C. Knights & Co.; Thomas Cogswell and O. H. Wallis, of Cogswell & Wallis; E. V. Wendell, of Charles Wendell's Sons; H. H. Butts, of F. Hart; L. W. Arnold, of the Illinois Watch Company.

Guests—Mayor Carter H. Harrison, Frank B. Wilkie, of the *Times*; Hermann Raster, of the *Staats Zeitung*; S. J. Seaton, agent of the American Express Company; Anson Gorton, agent of Adams Express Company; J. J. P. Odell, cashier of the Union National Bank; W. H. Moore, of Chicago; E. C. Hine, president of the New York Jewelers' Association; Jacob Bunn, president of the Illinois Watch Company; S. A. Rider and A. Jacobs, of St. Louis; R. N. Hersfield, of Leavenworth, Kan.; J. R. Richards, Robert M. Wilcox, and W. H. Paine, of New York, and the following jewelers of Chicago: S. Hyman, C. D. Peacock, E. N. Roddin, B. R. Chambers, W. B. Clapp, E. A. Strelitz, J. Florsheim, A. L. Sercomb, J. C. Rich, and F. E. Morse.

After full justice had been done to the elaborate and bountiful repast provided, cigars were lighted, champagne was introduced, and the assembled guests prepared themselves for the intellectual feast that followed.

ADDRESS OF PRESIDENT HAHN.

Gentlemen and Fellow-Members of the Chicago Jewelers' Association:

I cannot begin the remarks which fall to my lot to make to you tonight more appropriately or more pleasantly than by congratulating you upon the gratifying results of the business of the year, and expressing our confidence in the promising outlook that the future shows us. Our social reunions are always pleasant, but each partaker of the good cheer spread before us to-night feels his satisfaction enhanced by the thought that the twelvemonth last past, has been one of prosperity, and your welcome presence at this, our fourth annual banquet, is evident that you have traveled peaceful paths since we last met together.

The bountiful harvests—the root of prosperity—and the settled policy of the government had stimulated a general revival of business, perhaps nowhere more noticeable than here in the great northwest. The jobbing jewelry trade of Chicago, composed, as it is, of energetic, capable business men, prepared to meet this welcome increased demand, and by utilizing the records of the Jewelers' Association, we found ourselves in a position to deal out credits more understandingly and more judiciously than at any time before. The credit system carries with it solicitude at all times; and now the insecurity of promiscuous credit under the widely-varying collection laws of the different states, demands greater watchfulness, for they effect equally both creditor and debtor. Each wants his due measure of protection, and he wants no more than that, and, when that is secured, but

two things more remain—patience and forbearance on the side of the creditor—honor and stability on that of the debtor. On one side there should be no harshness, no grasping greed, no desire to push to the wall; on the other side there should be a recognition of the great business principle that honesty is the best policy.

We are honored to-night by the attendance of gentlemen not familiar with the details of our organization, and a few words on this point may be permitted me. Prior to the formation of the Jewelers' Association we were dependent for information, as to the standing of customers, chiefly upon the different business agencies, which, though of value, do not at all times cover the ground sufficiently. From a mutual desire sprang our organization in July, 1876, which was organized under the laws of the state, in May, 1880. We have an elegant office wherein we hold our meetings, and employ an assistant secretary to keep the records and issue *The Daily Sheet*, giving the report of every inquiry and answer made, as to the standing of the dealer asking credit; and each member feels in honor bound to answer the inquiry according to the experience he has had with him. All answers appear upon our *Daily Sheet*, which is issued to every member.

To demonstrate the value of our Association is briefly to recapitulate our work. We have the names of 6,487 jewelers. The special inquiries from July 1, 1880, to Jan. 1, 1881, were 1,790; letters of information, received from sources other than ourselves, from July 1, 1880, to Jan. 1, 1881, were 815. Thus the private information of one becomes the common property of all. Bad men are blocked out, while honest dealers, though possessing but limited means, are fostered and protected. We meet mouthily, not to monopolize, not to conspire, not to oppress, but for one hour we meet as brethren, having common interests, and for the other twenty-five days and nine hours we are competitors in all that the name implies.

And now, in conclusion, I pass to another subject, which I have kept for the last on the same principle that the dainties of our banquet followed the substantial. It is my honor and my pleasure to call your attention to the fact that we have with us to-night the chief magistrate of the city of Chicago. As your spokesman, I gladly welcome to our midst the Hon. Carter H. Harrison, to whom we all look for protection. This visit from the representative of all the citizens of Chicago is an honor which we appreciate and shall not forget. It also gives me pleasure to welcome here gentlemen prominent in other occupations, who have made their mark in the history of the city, or in the annals of mercantile life. We greet them warmly, and trust that the memories of our meeting to-night may be renewed again and again.

Hitherto, as befits a young and modest Association, our reunions have been confined to our own numbers, but now, animated by confidence born of success, we want our brethren in other walks of life to learn what we have done, to see that ours is an organization of which Chicago need not feel ashamed, and to share with us those social joys that make us forget the labors of the day, and strengthen us to meet those of the morrow.

Friends and gentlemen, let thanks for the past and hope for the future be our watchword to-night.

The President then announced the first toast of the evening, "The City of Chicago," which was responded to by Mayor Harrison.

REMARKS OF MAYOR HARRISON.

The speaker playfully asserted that he very much preferred eating to speaking, but as he was expected to do something of the latter on this occasion, he would endeavor to perform his duty in this respect as he did in all others. He then alluded to the prosperity of Chicago in all material things—to its great railroad interests; to the fact that it is the grain center of the west; to the number of hogs slaughtered annually; and complimented the jewelers on belonging to one of the oldest guilds in the world. The business was the most attractive one, manufacturing the most beautiful metals into the most beautiful shapes. His honor described the history of a man's life as it is connected with

the jeweler's art, from the silver spoon in the mouth to the silver plate on the coffin. He then expanded on his pride in Chicago, which he described as the metropolis of the greatest country in the world. He referred to the protection which the mayor and police afford to the jewelers of Chicago. In commenting upon Chicago as a great city, he told his hearers that the democracy lost the presidency simply because it had no more brains than to hold its national convention in Cincinnati instead of Chicago. He had, he said, been wedded to Chicago for many years, but would, probably, be divorced officially, in April next. This mattered little to him personally, but, in whatever position he might be placed in the future, he would always be found loyal to Chicago.

The next toast was "Our Nation," which was responded to by Hermann Raster.

REMARKS OF HERMANN RASTER.

The speaker said he was glad that he followed Mayor Harrison on a theme of less importance, for after Chicago it was proper to speak of the Nation. He connected his sentiment with the occasion by calling the United States the brightest jewel of the most finished workmanship that the world ever saw—a nation of all the civilized nations of the world. Continuing this figure, he spoke of the amalgamation of other nations to make a solid commonwealth in North America, and spoke of the time when one-tenth of an inch of America should be spread over twenty inches of the rest of the world. He spoke generally of the greatness and importance of America, of her prosperity, and of the grand improvements, physically and morally, that are now going forward in the Nation. The remarks of the speaker were full of sound patriotism, interspersed, of course, with laudations of Chicago.

The next toast, "Commercial Integrity," was responded to by W. H. Moore, of Chicago.

REMARKS OF W. H. MOORE.

The speaker alluded pleasantly to the incongruity of calling upon a lawyer to talk about integrity, and then proceeded to compliment the jewelers upon the prosperity of their business and the success of their Association. In concluding, he said that the capital of the East would never have found its way to Chicago in the hour of her necessity had not the commercial integrity of her people invited it, and inspired that confidence that stood as security for it.

"The Jewelers' Trade of the Northwest," was the next toast, which was responded to by Mr. W. W. Wilcox. The speaker referred to Chicago as the center of the jewelers, as of all other trade, and as being, also, the center of the universe. The trade of Chicago, he said, extended not only throughout the West and Northwest, but its ramifications embraced the whole world. The East, or even Europe, would be very good places to live, were it not for the fact that they are too far from Chicago.

The "Press of Chicago" was appropriately responded to by Franc B. Wilkie, who complimented the jewelers upon the commercial importance of their calling, and the integrity that characterizes their transactions.

R. N. Hertsfield, of Leavenworth, briefly responded to the toast "Our Guests; we bid them Welcome."

Mr. Hine, President of the New York Jewelers' Association, was next called upon, quite to the surprise of that gentleman, who had understood that he should be allowed to enter into the festivity of the evening without fear of being bothered with speech making. After repeated and urgent calls had been made for an address from him Mr. Hine was induced to respond, and made a speech which was declared by many to be the most entertaining of the evening. He began by imitating what Senator Conkling said at New England dinner held sometime in 1874, and remarked that he had searched with great care such annals of the Association as had fallen under his eye, and had failed to find any recorded instance where any guest or member of their Association ever suffered from embarrassment or neglect. He went on to say that the jewelers were under obligations

to clock pedlars. This class of men certainly had been considered disadvantageously by the jewelers. The clock pedlars were not given the credit that they deserved. They could sell clocks for less money than anyone else. They could frame an axle, turn a flap-jack, and so many other interesting things, too numerous to mention. He congratulated the jewelers upon the prosperity of their Association and upon the marvelous growth of Chicago. Hardly half a century covered the history of their city, whose wondrous growth was so recent, and the limit to which no man can fix. Mr. Hine asserted that he was present to rejoice with the Association in their prosperity and in the prospects of the future. He did this in no envious or jealous mood. He was not there to speak about or apologize for the great city and state which he called his home, but would give them a little history of New York. With some interesting remarks on New York City and the New York Jewelers' Association, both of which he extolled as much as was safe in presence of a Chicago audience, he brought his remarks to a close.

There was more speech-making of a desultory character, and the entertainment was kept up to a late hour. It was a most enjoyable evening throughout, the Association especially distinguishing itself in the character of a host. The attentions lavished upon the guests of the evening were unremitting, and were fully appreciated. The banquet was a success in every particular, both from an oratorical and gastronomic standpoint. Delmonico has sometimes thought that he could engineer a banquet with great credit to himself and his guests, but beside a Chicago lay out, even Delmonico "pales his ineffectual fires."

The New Alloy, "Arguzoid."

ARGUZOID is the name of a new composite metal, the invention of a Glasgow metal worker, and is thus described in the *Inventor's Record*: "In appearance it approaches silver nearer than any other metal or composition we have seen; it is even whiter than a nickel plated article, and in fact there is but the slightest shade of color departing from the white, that enables it to be detected from the more precious metal. At present it has only been introduced as a cast metal, being run into ingots, from which again it is remelted, and cast into any article required. It hammers well, and arrangements are now in progress to roll it into sheets. It is about half as much again in price as brass, is cheaper than nickel-plating and electro-plating on brass or copper, and has, besides, the unquestionable advantage of being solid throughout. We have had an opportunity of seeing the metal in the ingot, in its hammered state, and of examining several manufactured articles, such as bath fittings, spirit-cocks, gas-brackets, carriage handles, &c., in their finished state, and a nearer approach in appearance to sterling silver it would be almost impossible to produce. Its cohesive strength is only surpassed by silver itself. Brass breaks at 10 tons pressure, phosphor bronze at about 14, while arguzoid requires nearly 16 tons before it succumbs. In ductility it is similar to brass, and the only point on which any doubt at present rests, is as to its powers of withstanding atmospheric changes as regards its color, but from experiments so far made, no fear is entertained by the inventor on that point. Its capabilities in this direction are however, soon to be put to a severe test, and if it passes through this ordeal scathless, an immense field for its use in one direction will be open to it. One of the Cunard Company's steamers is to be fitted up entirely with arguzoid fitting. It is well known that nickel plating has been tried for ships and proved a failure, the action of the sea-air and water completely destroying its appearance in one voyage. Plating with silver is necessarily costly and requires much cleaning. Brass is open to the same objection as regards cleaning, and is not considered good enough for high class vessels. It is almost impossible to contemplate the revolution this composition will effect, should further experiments confirm our present impressions, and we look forward, in common with the inventor, with interest to the result of his important invention."

Practical Hints on Watch Repairing.

BY EXCELSIOR.—No. 69.

THE PRACTICAL EXAMINATION OF TOOTHED GEARING—CONTINUED.

(1,090) In Fig. 68 the first contact occurs at 10° , or one-half the

Fig. 68.

breadth of the leaf, before the line of centers, which is all we could desire with a 6-leaf pinion. By looking through the different positions we find that the addenda of the teeth act well on the pinion leaves, as there is scarcely any pointing, no slipping and no drop. In position 3 we notice that the tooth comes near bottoming, which makes us suspect a deeping too deep or addenda too long. As we have already found that the action of the gearing is good, we are satisfied that the addenda are none too long for a 6-leaf pinion, nor can the deeping be much, if any, too deep—and inspection of the different positions shows that the deeping is correct, for the widest part of the tooth and of the leaf touch when the acting surfaces pass the line of centers, showing that the pitch circles of the wheel and the pinion just meet. This, with the fact that the first contact occurs at 10° before the center, shows that the addenda of the teeth, although longer than strict theory requires, have that length which watchmakers are accustomed to give to them when working into a 6-leaf pinion, for that is the very point where they seek to make the driving commence. We conclude that we have a good practical working gearing, which we cannot well improve, except by dressing the spaces of the pinion a little deeper, to avoid danger of bottoming when the wheel gets dirty. If it is a fine movement, or one which will be well taken care of and cleaned as often as it should be, even this alteration will be unnecessary, and we shall pronounce the gearing right. It is in fact precisely such a gearing as that in Fig. 67 will be after we have corrected the defects we have discovered in it.



Fig. 69.

(1,091) In Fig. 69 first contact occurs almost on the line of centers, showing addenda of teeth too long, deeping too deep, or pinion relatively too small. In position 1 we see that there is almost a drop before contact occurs, which looks like a pinion too small. There is considerable slipping between positions 4 and 1, which, also, may be caused by a pinion too small. The catching, in the same position, may be caused by pinion too large, addenda long, or improper deeping. Inspection of positions 1 and 2 shows the deeping to be too deep, for the widest parts of the teeth and leaves (i. e., where the straight radial flanks join the curves of the addenda,) pass each other, and the straight surfaces of the teeth and leaves *lap* as they cross the line of centers, instead of just meeting, as they should. The bottoming in positions 2 and 3 will be prevented by changing the deeping. The catching in position 4 will also be cured by the same means. But it is evident, from inspection of position 1, that if we do so change the deeping we shall have considerable drop, for the point of the tooth will pass off the leaf some time before it reaches this position; this proves either a pinion relatively too small, or addenda too short. Judging from positions 3 and 4, and also position 1, the addenda are all well formed but short—not excessively so, but of about the length characteristic of the epicycloidal form of tooth. There remains therefore, the drop to be accounted for, which can now only be caused by

a pinion relatively small. But as the drop will be the only fault we can attribute to the small pinion, and as no drop was caused by the addenda being rather short, we conclude that the pinion can be but very little too small, the deeping is too deep, and the addenda of the teeth are of about the correct epicycloidal form and length. To ascertain the exact amount of each error, or if there is any error, we can resort to measurement of the parts when the movement is taken to pieces.



Fig. 70.

(1,092) In Fig. 70 contact occurs about 35° before the center, which is 15° too far off for an epicycloidal tooth, and 25° too much for the ordinary form of addenda. On inspection, the addenda of the teeth are found to be rather long and about as they are usually made, so that contact ought not to have occurred till the parts reached position 3. Consequently there is premature contact (35° too soon,) and excessive wedging, indicating either a shallow deeping, a pinion relatively large, or addenda too short. We have already seen that the addenda are rather long. We perceive no tendency towards catching, and the pinion cannot be too large. By inspection of positions 3 and 4, we find the deeping scant. Positions 5, 1, and 2 show that the acting surface of the addendum is well formed, and with a correct deeping the contact would begin in position 3, proving that the length of the addenda is that usually given by manufacturers for gearing into 6-leaf pinions, and the only error is a scant deeping. Position 1, with its excessive wedging and friction, shows how serious a result can be produced by a slight error of deeping in a gearing which is in every other respect unobjectionable.



Fig. 71.

(1,093) Fig. 71 needs but little explanation. The pinion is plainly altogether too small, and positions 2, 3, 4, and 5 show that the deeping is also very shallow. Whether the deeping would be correct after a larger pinion was substituted, can be ascertained by measurement of the parts, as already fully directed—also, whether the addenda of the teeth are of correct length. It is therefore unnecessary to examine the action in detail. Positions 1 and 2 are practically the same, but are inserted in that way in order to exhibit the drop which occurs at that instant.



Fig. 72.

(1,094) In Fig. 72 we have a tough case. Contact occurs on the line of centers, which is much too late, and shows either addenda too long, deeping too deep, or pinion relatively too small. Inspection of positions 1, 2, 4 and 5 shows that the deeping is considerably too deep, and that setting the wheel and pinion further apart will correct the bottoming in positions 2 and 3, and the catching in position 5. The next question is whether the pitching is also wrong. Positions 1, 2, and 4, show no fault in the action except that of deeping and its results—and if any error existed in the pitching it would certainly be manifested there. We therefore conclude that the wheel and pinion have correct relative sizes. The driving tooth clogs, between positions 3 and 1, indicating addenda too long, but it is evident that the clogging would cease if the deeping was corrected, for the pinion could then be retrograded to position 4, and the manner

in which the addendum lies alongside of the pinion leaf shows that it is well formed. Contact would then occur very shortly after position 5, from which we perceive that the addendum is of the long form usually adopted by manufacturers, to go with 6-leaf pinions. Hence the whole of the trouble with this gearing is caused by a deepening too close, unless we desire a strictly epicycloidal tooth, in which case we must also shorten and round up the addenda.



Fig. 73.

(1,095) In Fig. 73 contact occurs about 45° before the line of centers, so that three-fourths of the driving is done before the center, and only one-fourth after it. This premature contact also causes the wedging to become a butting. It indicates either a pinion relatively large, deepening scant, or addenda too short. As for the addenda, we cannot judge by their action, for they get no chance to act, but from inspection we pronounce them of correct epicycloidal form. Inspection of positions 3, 4 and 5, shows the deepening to be very shallow. But by looking at the effect which would be produced by correcting the deepening, *i. e.*, showing the wheel straight up, we see that we should have first contact even earlier than now, thus proving that the pinion is also relatively much too large. This is seen most plainly in position 5, where contact would occur almost immediately if the deepening was made correct. The exact point where contact would take place would be the same as shown in position 1, in Fig. 65. This gearing therefore requires a smaller pinion, and the deepening made closer, and would be still further improved by longer addenda on the teeth, although they are none too short for strict theory, and may be left as they are if we desire the epicycloidal form of tooth.

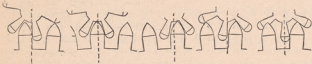


Fig. 74.

(1,096) Fig. 74 shows about the worst case we have had. In fact, it would be impossible for such a gearing to go, and it is only drawn out in order to illustrate the effects of certain errors of construction. First contact occurs a little after the line of centers, which is too late a contact for even high-numbered pinions. Contact should occur on the center with pinions of 10 leaves and upwards, and from 10° to 20° before the center with 6-leaf pinions. This late contact shows either a pinion relatively small, deepening too deep, or addenda too long. Inspection of positions 1 and 4 shows that the deepening is really too deep, but not excessively so—hence, a portion of the extraordinarily faulty action must be caused by other defects. The catching and clogging in positions 4 and 5 show that the addenda are too long, even if the deepening should be corrected. There is no drop, but position 1 shows how close it comes to dropping, which is only prevented by the deep deepening and long addenda. The tendency to a drop indicates a pinion relatively small, but as no drop actually occurs the pinion is evidently but little too small. By fitting in a larger pinion and giving a correct deepening, we shall cure this tendency, as well as the bottoming in positions 2 and 3, and the catching and clogging in positions 4 and 5. We may therefore leave the addenda as they are, after making those changes, as inspection shows that they have about the customary form with this kind of pinion.



Fig. 75.

(1,097) Fig. 75 is nearly as bad. Contact occurs nearly 55° before

the line of centers, so that the driving done after the center is almost nothing, and we have an excessive amount of wedging and actual butting. The fact that nine-tenths of the driving is done before the center, indicates either a pinion relatively large, deepening too shallow, or addenda too short. Inspection of positions 4 and 5 shows that the deepening is too deep. As the addenda of the teeth have no chance to drive, they cannot be the cause of the trouble, which must therefore necessarily be a pinion relatively too large, and position 2 shows that it really is considerably too large, for the departing leaf butts against the tooth before it is getting out of the wheel, showing both too large a pinion and too close deepening. As for the addenda, we judge from the manner in which they lie beside the pinion leaf that they have the correct form. With a correct gearing and an epicycloidal tooth contact would begin in position 4, and it is evident that the tooth could drive the leaf to that position without pointing, which, together with ocular inspection, satisfies us that the addenda are correct in form and length, and that the real trouble is that the pinion is relatively much too large, and the deepening much too deep.



Fig. 76.

(1,098) Fig. 76 shows the action of a pinion much too small. It is impossible to get a correct deepening, as is seen by position 5, but by setting the wheel and pinion well apart they might go for some time. Of course the leaf would dig into the tooth and gradually cut a groove into the face, followed by inability to run. Positions 4 and 1 are substantially the same, showing the drop between the former and the latter. The addenda of the teeth seem, from inspection, to be correct in form and in length, but a very much larger pinion is needed, and perhaps the deepening will also need to be changed. This can be told by measurement.



Fig. 77.

(1,099) Fig. 77 shows a gearing which would be passed as good by most workmen, but it is not correct. Positions 1, 2, 3 and 4 show that the deepening is much too shallow. Nevertheless, first contact occurs about 15° before the line of centers, showing both that the addenda are long, and that the pinion is relatively small—for the contact would have begun further from the center had the pinion not been small, and we should have had pointing and almost a drop as a consequence of the scant deepening and small pinion, had not the addenda of the teeth been long. Inspection of positions 4, 5 and 1, shows that the manner in which the addendum curve acts on the leaf is good, for there is no pointing, and the curve lies satisfactorily against the leaf, from which, together with inspection, we pronounce the addenda well formed—not of the length characteristic of the epicycloidal tooth, but of the somewhat greater length practically preferred by many makers for gearing into 6-leaf pinions. But the pinion is a little too small, and the deepening is too shallow.

A WRITER who has devoted some attention to the decorators and artisans of Japan says that the worker in metals is, without exception, the most artistic; but that Japanese workmen and artists discard utterly the happy-go-lucky method in their work. They undergo a thorough training in ancient custom and precedent. Hand-books with elaborate instructions and progressive lessons are cheap and accessible to the poorest, for circulating libraries abound. From first strokes to the finished drawing, and for each class or style of design there are many elaborately illustrated works of reference.

Faults in the Anchor Escapement.

BY H. SIEVERT.

IN our January number we laid before our readers a condensed translation of Herman Sievert's article "On the anchor escapement." We reproduce below another one, written by the same able pen, and published in the *Deutsche Uhrmacher Zeitung*, Dec. 1, 1886. The tenor of the introductory lines leads us to conclude that some correspondent desired a few of the most glaring defects of this movement pointed out, with directions how to remedy them, to which Mr. Sievert responded as follows:

The question contained in your two lines of inquiry is so weighty that even with half exhaustive responses, entire books might be filled; the mere enumeration alone of the defects would by far surpass the space allotted by the editor to the "Correspondents' Column." I will, however, essay to briefly describe a few of the chief faults.

There are, alas! anchor watches of so miserable a construction that the question often arises to the repairer why they were made at all, if not alone for the sake of the name; the most common cylinder watch gives better service. I treat of that kind which has been put together without regard to workmanship, or anything else, and where extreme cheapness was the only ruling principle. I must declare openly that I despise to even set in motion such a construction, lodged in the very putting together of the escape wheel and anchor, and it were well if the right-minded watchmaker could refuse to touch such a thing. It would be the best way to stop the sale of such frauds. The principles involved in the anchor movement are so inseparably connected with known mathematical laws that the smallest deviation from them, produces numberless defects, and any subsequent endeavor by the skillful workman to rectify the faults of such a thing, will seldom be worth the pains.

Ascertain if the movement possesses a passable amount of repose on both sides, by driving the fork slowly forward to the drop of the tooth. The repose, in bad cases, may be small; if, however, it is so large as to be equal to or exceed one-half of the motion, the defect cannot be passed by and must be corrected. If the escape wheel and anchor are so unsuited to each other that the drop of the wheel is too large, the fault must be radically removed; a mere rectification is out of the question—never, under any circumstances, attempt to grind down the teeth of the wheel. If the repairer cannot refuse the job, his only remedy lies in substituting new wheel and anchor, in accordance with the deepening tables treating of this part of the movement. Well-fitting pivots and jewel-holes, possessing sufficient freedom of motion; no excess, however, are supposed to be present.

The fork, and its connection with the balance requires the labor of the watchmaker. It is the hiding-place of many a grievous error, however. The boundary of the fork's motion is of great importance, which should be contracted as much as possible—that is, the fork must have nearly accomplished its motion at the time of the drop of the tooth. A banking of the fork near its fore is very reprehensible for two reasons—first, despite all care, gley matter in the shape of oil thickened with dust, will form, and second, because an adhesion at that place demand a certain increase and waste of power. Two round banking pins inserted, on account of the little surface they present, are the best remedy.

If it should be shown, after the motion of the fork has been rectified, that it does not beat equally toward both sides of the balance center, which can be easily ascertained upon inspection, it must be bent accordingly.

Next put in the balance, and examine the connection of fork and ruby pin. A sufficient amount of play in the fork's incision can easily be judged, and excess is very hurtful to the rate. Too short a fork may be suspected when at the exit of the pin there is too much play between the fork and the outer wall of the deepening, toward its fore corner. The fork must be of sufficient length to permit the exit of the pin. The repairer will notice on close examination, by revolving

the balance backward, a banking of the ruby-pin on the fore corner of the inner side of the incision. This fault may be classified with those of the anchor escapement for watches—the escapement takes place under the greatest possible disadvantage.

There is a very simple way to lengthen the fork and at the same time contract its incision. Before stating it, I may be allowed to make a remark. It is a widely-spread opinion that the fork, if of steel, must be well hardened to withstand wear and tear. This is not at all necessary, although a soft one would be apt to bend. When a very hard and well-polished surface works together with a soft one, no noticeable wear takes place in either, and the friction is as great when the softer surface is only filed smoothly, instead of being polished, (both surfaces must not be made of steel, however). This fact becomes of use in the rectification of the fork, since a hardening of the latter after being finished is inevitably followed by the twisting out of shape. Heat the fore end of the fork to a steel blue, lay it with the knife down upon the sharp corner of a small anvil, and lengthen it by blows from the flat side of a hammer. When this is performed thus that the outer side of the fork is lengthened most, it is possible to close the incision thus that it has to be filed out to answer its purpose. If the fork has become too long file it to correspond, to allow a free entrance and exit to the ruby pin, taking care, however, that the knife remains in the center line of the incision, and that the fore corners of this are kept square, not rounded off.

Of less importance is the play between knife and staff roller. It should not be so contracted as to permit a cramping, or, on the other side, be so abundant that an escapement occurs by pressing the knife against the roller; the mean between these two extremes is enough. These exactments are interfered sadly with, on undue amount of side play with the pivots, or an untrue staff roller. It is not difficult to grind this to a true round, between the turning points of the deepening tool, and carefully polish it. Many rollers can be turned instead of ground into the right shape. If it should be found that the knife is too short, lengthen it in the middle, instead of the incision, whereby two errors are corrected. When the ruby pin is too short and produces an occasional stopping of the watch, let the short fork alone and choose a larger staff-roller. A trifling increase is attended by remarkable beneficial results. Of course, these occasional stoppings of the watch cause a very irregular rate.

Great stress should be laid on the counterpoise of the forks; an absence leads to many disturbances, when the fork is too long and too heavy. It is not said that the lifting of the fork in certain positions influences the rate very much, since the reverse movement compensates the evil, but sudden jolts and jars are apt to be followed by a premature escapement, which is the chief cause of danger. It occurs often that the knife, by a sudden striking of the staff-roller, is held fast, and passes through by bending or fracturing a balance pivot, or causes other less hurtful irregularities. While endeavoring to establish this counterpoise, fearlessly file down the heavy shoulder generally found in forks that are too long, and diminish the size of other parts which are too heavy and disproportionate. When it has been obtained, only a small exertion of the anchor is necessary to prevent premature escapement. A movement in which the locking angles are wanting entirely, is but seldom found, and by establishing the counterpoise of the fork, a defect is removed which many a repairer has endeavored in vain to remedy. To re-shellac the pallets is a doubtful piece of proceeding, and one productive of many and greater evils; always bear in mind the exact mathematical construction of this escapement.

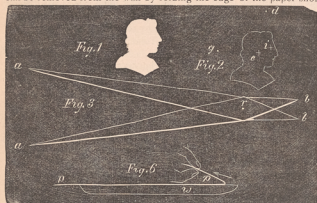
Differences of rate may also be produced by defective conditions of the balance. It may be too large, thus offering with its compensating screws, too much resistance to aid; one too small as well as one too light is apt to bank; a balance which is too heavy and small, conditions which, however, seldom occur, will regulate badly in the different positions. Screws may be very loose, or it may not be evenly balanced. The latter is not always found in all tempera-

tures, when a badly made balance is cut open. That defective jewel holes, pivots, or balance springs, loose ruly pins, etc., are the source of many an occult grievance, is known to the practiced repairer. If the skillful workman has endeavored to correct the timepiece under repair, as pointed out to him above, he has reasonable hopes of success.

Gem Engraving.

BY AN EXPERT.

IN modeling with wax for intaglio engraving, you should use white or bleached beeswax, sometimes called Virgin-wax—or wax such as was used for candles to be burned before the image of the Virgin Mary. The wax is to be melted and the best vermilion stirred in—the proportions are—one ounce of vermilion to four ounces of white wax. The stirring should be continued until the wax begins to set or stiffen; or the vermilion, being much the heaviest, will all settle to the bottom. Sometimes an ounce of Spanish white (common whitening) is added at the same time as the vermilion; this adds more body and gives a crispness to the composition, while it does not alter the color materially. The colored wax, when cooled down to about the consistency of thick cream, is to be poured on a sheet of common writing paper to cool. If the proper condition was taken advantage of (that is, when the wax was too thick to permit the color to settle, and still thin enough to flow on the paper) an even sheet of wax will be obtained, varying from one-eighth to one-sixteenth of an inch in thickness. The flowing can be facilitated by laying the paper on a piece of flat board a trifle larger than the paper, and then inclining the board in the way you wish it to flow. After the wax has become cold it can easily be removed from the paper—or rather, the paper can be removed from the wax by folding the edge of the paper short



back, as shown in Fig. 6, where w is the wax, and p the paper. The fingers and arrow show the manner and direction of pulling. In modeling with this wax, procure the whitest and thinnest glass you can obtain, and cut it into pieces two and one-half by three inches square; heat it over your lamp and rub on hard red sealing wax until you have a smooth, even coat. Let it cool, then turn this side down, and it looks like a very smooth tablet of sealing wax. On this tablet you are to make your design in the soft red wax described above. Some designers use black or dark glass to model on, but the contrast is too violent, and moreover it does not give a correct idea, as the impression ultimately will have to be red relief figures on a red ground. Models are usually executed on an enlarged scale, say of four to one; suppose you are about to engrave a head which will be one-half an inch long; your model will be two inches in length and proportionately wide. Now cut from your sheet of soft wax (and for this size it should be fully an eighth of an inch thick) a piece of the general form to be designed; warm your piece of coated glass to a little above blood heat, and press the piece of soft wax on. Of course you will remember the soft wax is applied to the opposite side to the one coated with sealing wax. As soon as it cools it is nearly ready for manipulation. The cutting and shaping can be done with various

shaped tools, but the point of the nail blade of an ordinary pocket knife will answer almost every purpose; and as soon as you need other tools, they will to a great extent suggest themselves. But cutting and scraping with the nail blade (or a similar shaped tool) will be the method to be relied on. Blunt instruments raise the wax on each side of the line of indentation you may make with one, and as a rule are not to be used. Still on some occasions this very feature can be taken advantage of; suppose you may have cut away some portion of your work too much on the margin or outline; your knife edge inserted a little way back from margin and drawn parallel with it will force the wax out, and the incision can be filled with a little of the chips you have cut or scraped off—heat your knife a little for the last part of this operation. A round stout point can be used in the same way where you want to raise a portion of your work of this form. It is well to make a drawing of your work before you commence your wax model, to get a general idea of the form and proportions. Still, your best efforts will be in the wax. It is astonishing to a person who never saw modeling of this kind done, with what facility it can be molded and scraped, even pushed about on the glass until the poise and pose of the head is satisfactory. I mentioned and described the modeling of a human head, but I would not advise the attempting of one until the pupil has had practice in other objects—a side view of a bird perched is a good design to commence on. Modeling and cutting, let one keep pace with the other. After the model is satisfactory it is to be transferred to the stone, (the design reversed of course) and in a reduced scale—one-fourth the size of the model. A small pentagraph could be used to transfer the outline from the model, with a diamond point, perfectly to the gem; but this would not be desirable for several reasons; first, in cameo engraving, which is by far the most beautiful of this kind of work, it would be perfectly worthless, and next even in intaglio engraving, it would give no details; consequently, it is better left out and depend on the educated eye, assisted by a pair of proportional dividers. I will now describe a very simple instrument of this kind which the pupil can readily make for himself, and they are really better for this purpose than a pair which would cost three or four dollars, as they are a great deal lighter and will not mar the model so much. Take two pieces of an old Yankee clock spring, (such as is used in alarms is the best) three and three-quarter inches long, and shape them as shown in the cut at Fig. 3. A pivot goes through both at r , and when closed the points a and b should be exactly opposite each other and near together as possible. The rivet is three-fourths of an inch from the points bb , this ensures a proportion of two to one, and this is a good scale to adopt for all your models. Spirits of turpentine mixed with a tenth part of olive oil (or watch oil)—keep it mixed in an old watch oil bottle—this menstrum mixed with dry Indian red and used with a fine camel's hair pencil to paint on the head as shown in Fig. 1, constantly testing your work with a pair of dividers. The painting is merely a flat tint of Indian red without any details, but the outline or margin can be shifted until it appears all right, then trace the outline with your diamond point, and after the outline is complete the color can be wiped off, and the design will appear as in Fig. 2. Now the question is how to get rid of our surplus stone inside our outline; large globe cutters are the best; those made of copper and filled like the copper lap previously described, are the most efficient; these are used with water. In establishing details like the ear, eye, &c., your proportional dividers are indispensable. Select two points on your model glass at right angles, say at d and g ; here with hard steel point make slight indentations, also make two in your gem in the same positions relatively; now by setting the long ends of your dividers on the wax model, the close or short end will give you the distance eg . If you smear some of your Indian red and oil on the gem, and the mixture dries a little, a curve can be swept by your dividers (keeping g as the center) as shown in the dotted line at e , using d as a center, you get the other dotted line and establish the point e in your work, which is the center of the ear; i is found in the same way. In practice the large globe cutters are used fearlessly

until the general form is established; then the details can be located with the dividers. I should have mentioned that in making the little points or pits *d* and *g* in the gem itself, you should use your diamond tracing point, and only make them large enough to be felt, as they will have to be polished out when the head is finished. The diamond point is rotated by turning the handle between the thumb and finger. These points can be established so near the edge of the stone as to be removed easily.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH.

I would advise you to stick to journey work until you have just an even thousand dollars saved. This will not take so very long—three years of health and industry coupled with economy will do it, and at the same time provide you with a good set of bench tools. During the latter part of this time you can be watching out for bargains in a second-hand fire-proof safe, also a show case; by taking advantage you can buy for cash such articles for one-half or one-third what they would cost new, and be equally as good. A very important question in a young man's life will assert itself about this time; and this is marriage. Now I want you to understand that I in no way disparage this important element of human happiness; but I also advocate prudence. I have known and know a dozen young watchmakers, who, just as soon as they became journeymen and got to earning twelve or fifteen dollars a week, hampered themselves with a wife; and nine out of ten are struggling along still as journeymen, and battling in various degrees of poverty against actual want with such success as fortune may afford. All this might have been avoided by prudence and the exercise of a little patience. I know I am treading on delicate ground, but it is a question which has to be met and decided upon, and now is the time to settle it. Long engagements are discountenanced by the great majority of people, but they are much better than putting yourself into a position that you would back out of if you could. If you think enough of a girl to marry her, you had also ought to think enough of her not to wish to put her in a situation, that a few months' sickness on your part would reduce not only yourself, but her to great necessity. No, it is far better for both to wait—if she is worthy of you and sincerely desires to promote your interest and happiness, she must see it in the light which is obvious to any unbiased person, and wait patiently, not only until you get into business for yourself, but until you get established and doing well. A better way is to make no engagement of matrimonial import until you are successfully doing business for yourself; this will enable you to make a far more desirable alliance than would be possible were you merely a journeyman. Hoping you will give this question all the consideration its importance demands, we will pass on to business considerations. After you have secured the sum mentioned and provided yourself with a safe and show case, and decided on the location, we will consider the details. Probably the party of whom you rent will fit up your store a good deal as you want it, as it is likely you will be a tenant for some years. Now comes the buying of your small stock of goods; let these be all bought for cash—*always buy for cash*. Invest about \$600—leaving the balance for a reserve. Divide about in this way \$100 in Yankee clocks, this including one you can use for a temporary regulator; \$150 in watch cases and movements; \$100 in jewelry; this seems very small, but it is quite enough for such a small stock; \$50 in plated spoons and forks; \$25 in spectacles; \$80 in safe and show case, and apply \$25 to fitting up your front bench. These altogether foot up \$530; the balance of \$70 put into larger tools and have a back shop where you can do clocks and other coarse work. There is a great disposition to divide the trades of watchmaker and clockmaker, but this will not do for you, if you mean to succeed, and you must add jobbing jeweler too; and your back shop will be quite as profitable at first as your front, if it is rightly managed. One of the essential tools is a good strong foot lathe; this had better be got at second hand, and will cost you

from \$25 to \$30. Those light amateur lathes are next to worthless. Such a lathe you will mostly use in tool making, and it needs for such work one heavy enough not to tremble. In addition you will want a heavy vice, which will cost you \$6, an anvil worth \$4, and a small grindstone, \$4. A cheap, strong bench, a few coarse files, some steel for making tools, square, $\frac{1}{4}$, $\frac{3}{8}$, and $\frac{1}{2}$ inch will be the sizes you will need. A small portable forge is nice, but you can do quite well without one, as they cost \$15 to \$25. An affair made precisely like the furnace or pot used by tinsmiths, only a little larger—if you can get curved fire brick have the outside made to fit these, only the outside diameter should not exceed 12 inches. Four inches above the draft make a hole one inch in diameter; the whole affair should be 18 inches high, with a cover to promote draft, and a small pipe 3 inches in diameter should lead from the back like an ordinary drum or cylinder stove. The pipe should lead into a chimney; out of a window will do, only protect well from fire. The pipe is necessary from two reasons, first, to get a draft and secure an intense heat, and next to remove the noxious vapor given off by the charcoal. This kind of coal should be used if it can be obtained, it is much better than coke and for all you will use of it the expense is merely trivial. This furnace, by inserting any piece of steel you wish to heat, in the hole above, the draft will soon get hot enough to either forge or temper; and by working from the top you can melt several ounces of gold, silver or brass. Some watchmakers pooh-pooh at such conveniences, but I tell you that if you wish to *work up* to a good business, this is how to do it. Large tools and knowing how to use them is no despicable adjunct to the finest workmen. I know of workmen who talk of and actually measure the one ten-thousandth of an inch as certainly as a carpenter could one-sixteenth on his rule, and can use a large lathe as well as a machinist, and make and finish a watch bridge or any unusual piece, while an ordinary workman was wondering how he should go about it. It is certain that the confined bench and small tool used exclusively by many watchmakers, lead to botching and pettyness.

(To be continued.)

Antiquity of Trade-Marks.

THE question has been asked somebody, "How old are trade marks?" who answers it by saying that they seem to be nearly as old as the industry of the race.

Ancient Babylon had property symbols, and the Chinese claim to have had trade marks 1,000 years before Christ. Gutenberg, the very inventor of printing, had a lawsuit about a trade mark, and he won it. As early as 1300 the English Parliament authorized trade marks, and the laws of America have always protected them. The theory by which a suit is brought for infringement of a trade mark is that its use deprives the originator of his property, and deceives the public as to the article. Extraordinary means have been required a all times to guard against the fraudulent use of marks of manufacturers.

In ancient times the greatest importance was placed upon the marks of individual workmen, because, as in the case of the armorers, valuable lives often depended on the quality of the workmanship. One old author complains that certain good and true soldiers were killed simply because the workmanship of their swords and arms was not good, and failed them when in battle. Very early, therefore, it was found necessary to make stringent laws against counterfeiting trade marks, and against scamped workmanship. Without protection in this one particular, trade would almost come to a standstill, because there are very few things, comparatively, that can be purchased upon their merits, judged at the moment. In general, we know the quality of goods by experience, and it is only after they have been in use that a certain judgment can be pronounced upon their quality. Having, then, once found that a certain workman's productions are good, we seek them again in the market. If we have no means of identifying his trade mark, the whole work of buying becomes a haphazard affair. The best goods at once lose their value. This was early discovered, and probably the successors of Tubal Cain were the first to use distinctive trade marks on their manufactures.—*The Carpet Trade Review.*

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Eighty-first Discussion.—Communicated by the Secretary.

[Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkins, Esq. Write only on one side of the paper, state the points briefly, mail as early as possible, as it must be received here not later than the eighth day of the month in order to be discussed and reported in the CIRCULAR for the next month.]

COLORING GOLD PLATE—LAQUER FOR CLOCKS.

Secretary of Horological Club:

I have made several gold solutions, but cannot get that pale color that is on plated jewelry. I cannot get anything but a raw gold color, and would like to know the trouble. I notice in the October number an article on repairing English clocks. How is the laquer spoken of made? Will some of your learned body please to answer through the columns of the CIRCULAR and oblige,
J. M.

Mr. Electrode replied that the color seen on plated jewelry is given either by mixing solutions of silver and copper with the gold solution, or the jewelry is colored after it is plated, by putting it through coloring processes. In either case it would be useless to give directions for doing it, as Mr. M. could not succeed without a good deal of labor and practice—more than an ordinary watchmaker can afford to devote to it, unless he is going to make a specialty of gold plating, and has enough to do to keep him busy. If he merely wishes to learn the method of doing it, out of curiosity, he will find quite a number of articles on that subject in the back numbers of the CIRCULAR.

A first-class gold-colored laquer is made by taking 1 quart of alcohol and 2 oz. of powdered turmeric, macerate together for a week, then filter through a covered filter to prevent evaporation of alcohol. To this liquid add $1\frac{1}{2}$ oz. of the lightest colored shellac, $\frac{1}{2}$ oz. of gamboge, and 7 oz. of gum sandarac. Put all into a warm place till the whole is dissolved, then add $\frac{1}{4}$ pint of common turpentine varnish. A cheaper laquer may be made by dissolving the shellac and gum sandarac alone in the alcohol, but it will not be nearly so good.

ERROR IN GETTING TIME BY PREVEAR'S TRANSIT.

Secretary of Horological Club:

If the Horological Club or anyone else, can explain to me the cause of the following experience, I will be glad to hear it. About the 10th of last July I set up a Prevear transit for obtaining time, and correcting my regulator. I set it up on time received here by telegraph daily from Chicago. Since that time I have kept time as taken by transit, but there has been a gradual gain on time received by telegraph, until at the present date there is nearly 10 minutes difference, although I have set my regulator back about $1\frac{1}{2}$ minutes in the meantime, to correspond with their time, until I find it is no use to try and keep with telegraph time. My transit is set up substantially, and I have standard marks by which I can tell if by any means it gets out of line or plumb from where first set. I use Bliss' table of corrections. Seven years ago I used the same transit for a year and was never more than one minute "out" from telegraph time over the same line. Only 12 miles from here are three good marine chronometers; I have compared with them often in the past few months, and I find I gain on them about the same as on telegraph time. It has caused a good deal of discussion here, and I have been unable to give any very satisfactory explanations to others or myself. In the last number of the JEWELERS' CIRCULAR, page 229, is an article entitled *A Solar Complication*. If what is stated there in regard to the increased rate of revolution of the earth around the sun, and the consequent shortening of time between sunrise and sunset, be true, would it not produce the effect of difference in time I have noticed? Is this an admitted, undisputed fact, in regard to the earth's revolution? Will other watchmakers who use a transit, and have compared with standard timepieces, state if they have observed anything similar to what I have, and can anyone explain the reason of the difference I have observed?
L.

Secretary of Horological Club:

I wrote to you about three weeks ago in regard to an unaccountable difference between my time as taken by transit, and that received here by telegraph. I think I have discovered the cause of the difference. It is this: my transit is not set up on the meridian for this place, and takes the time about ten minutes earlier than it should. I suppose the proper and only correct way is to set the instrument on

the meridian for this place, and then if I wish to keep my regulator on railroad time, which is about ten minutes faster, to set it ten minutes faster than the time taken by transit. I know there is an error on this account, but I hardly thought it could amount to ten minutes in about six months. If this is not the cause of the difference, I will be pleased to have light on the subject. Yours truly,
L.

As none of the members present were practically acquainted with the peculiarities of Prevear's transit, (all using Bliss instruments,) they were unable to say what the trouble was with it, but it was thought probable that Mr. L. has discovered the true cause of the error he had noticed. A transit instrument—all of the usual makes, at any rate—require to be set up on meridian, and probably Prevear's is no exception to the rule. If any of our readers who use that instrument can give any other explanations, we shall be pleased to receive them, as they will be of interest not only to Mr. L., but doubtless to many others.

As for the article on the acceleration of the earth's revolution, referred to, that is a mere squib by the "funny man" of the paper.

PIVOTING STAFF WITHOUT DRAWING THE TEMPER.

Secretary of Horological Club:

Will some one of your distinguished body inform me how I can pivot the staff of an American watch without drawing the temper in the staff?
APPRENTICE.

Mr. Uhrmacher replied that the drill must be made of the best of steel, made strong, so as to stand considerable pressure upon it, not pointed, but rounded ovally on the end, the edge sharp but not thin—as a thin edge dulls quickly, nicks easily and is liable to chatter. When drilling press hard but firmly and straight, work slowly, press the drill against the metal only in one direction—while cutting, and have patience. The cutting edge must of course be as hard as it can be got. Many workmen use fluids of different kinds to assist the cutting of the drill, but he did not approve of their use, and did not believe that they did any great amount of good. The latest idea of the kind is to keep the tool wet with petroleum (called "kerosene oil," in which is dissolved one-half the amount of turpentine. Others recommend spirits of turpentine in which a lump of camphor gum is kept, and to roughen the bottom of the hole with dilute nitric acid—first cleaning out the oil, or the turpentine, &c., before putting this on—and many other preparations are occasionally mentioned. But the good workman will be able to do all that is necessary and proper to be done, without any such helps. He would say, in conclusion, that it is by no means required to drill without drawing the temper. Some workmen do it, more to boast of it than on account of the job being any better for it. Some staffs are soft enough to drill with but little trouble, while others are so hard that it would be almost impossible to drill them without drawing the temper. If the temper is drawn to a dark blue, a pivot carefully fitted, and the staff then repolished equal to new, the job is in every respect as sound and good as if drilled without drawing the temper—and very possibly an extra hard staff might split, in driving a pivot into it. But in drawing the temper of a staff, Apprentice must be sure not to heat other parts, such as the balance, roller table, jewels, hairspring, &c. They are easily damaged, but it is very seldom that a staff is injured by drawing temper down to a dark blue.

WHAT A DIAMOND DRILL IS GOOD FOR.

Secretary of Horological Club:

Will some of your honorable body please inform me if a diamond drill is of any use to a country workman, and if so where I can obtain one?
J. E. H.

The principal use for diamond drills is to drill the holes in jewels. If our "country workman" wishes to do that kind of work, he must needs have not one, but many diamond drills. They can be bought of the leading material houses, but the better way to get them is to buy a small diamond or piece of diamond and carefully crush it. Among the fragments will be found a number that may be mounted in brass ferrules with hard solder flowed around it, and the sharp points used as drills. The balance of the fragments can be ground up into diamond dust, which is useful for many purposes. Full par-

ticulars on all these points can be found in back numbers of the CIRCULAR.

WATCHMAKERS RESPONSIBLE FOR WATCHES LOST BY FIRE OR BURGLARY.

Secretary of Horological Club:

I have one question I should like some member of your honorable body to answer, (through the JEWELERS' CIRCULAR, as it may interest others). To what extent are watchmakers held responsible for their customers' watches, left for repairs, in case of loss by fire or burglars? CUMBERLAND.

Mr. Regulator said that was a question of law, on which each State had its own legislation. The general principle is that if the watch was in the jeweler's hands for some purpose by which he received a gain or profit, as for repairs, or safe keeping which was to be paid for, or the like, he was bound to return the watch or make good its value. If it happened at the time to be in his custody for the convenience of the customer, so that he received no benefit from it, then he was only bound to take as good care of it as of his own property, and it was at the risk of the owner. But a definite reply can only be obtained by consulting a lawyer versed in the law of the State in which the jeweler does business—as it is the law which governs—not what the customer or the jeweler thinks would be right.

SAFETY WATCH BALANCE.

Secretary of Horological Club:

I enclose a watch, shown me by the widow of the late Geo. Ramsey, with a patent balance in it. I never had heard or seen the like; may be you never had either. I send for your inspection. Wind up and start, then select a picked one of your intelligent Club, and go into Central Park and have a good game of base ball, using enclosed watch for the ball. Or, if you are not able to stand that amount of exercise, take it to the top of your 7-story building, and gently drop it on the bald head of Mr. Screw-squeezer, or Adjuster of the French School, or other member of like quid. I won't warrant the head, but I will the watch. You can't break a staff or jewel in the latter, as you will see by the construction of the balance. After examination please return the watch to me, as it is thought a great deal of by Mrs. Ramsey, as a relic. Yours Kc., E. L. W.

The watch was wound up and started, and passed around for examination. Instead of the usual rigid arms, the balance had three arms, each composed of two elliptical springs, with one end attached to the center, the other to the rim of the balance. In case of a fall, these springs would of course yield, and avoid any danger of breaking pivots or jewels. To prevent the balance springing too far, and perhaps interfering with some other part, there were three ears with projections above and below the balance, arranged around it, so that the amount of its spring was limited by these brass pieces. What the effect would be upon the time-keeping qualities of the watch can be imagined. It was pronounced a decided curiosity, not only as a balance arrangement, but as showing how impracticable and actually injurious a so-called improvement can be.

Preparations were then made for testing the unbreakable qualities, as recommended by Mr. W. The weather being too cold for base ball, the Chairman ordered the step ladder drawn up in front of his desk, and, notwithstanding that the structure creaked ominously under the pressure of his enormous avoirdupois, slowly mounted to the top with the watch in his hand, ready to drop it on some inquiring pate below. He then expatiated on our duty to try all things, to test new improvements and inform the trade and the world of their real value, their merits and their demerits, so that all might profit by our opportunities for acquiring knowledge, and we should be a blessing to the craft and a joy forever. Unfortunately, Mr. Screw-squeezer and the Adjuster-of-the-French School had gone where the woodbine twined, and had therefore lost this great chance to connect their names with a scientific investigation into the laws of nature, and the possibility of obviating their effects or controlling their manifestations to suit the requirements and exigencies of horological constructions and constructors.

But he said there were still among us heads as hard as were ever

hit, and he called upon the members to come forward and offer their bald pates upon the altar of science, to experimentally test this new and wonderful device for preventing the breakage of pivots and jewels, and immortalize themselves forever. Strange to say, however, there was an unaccountable aversion to volunteer for that service. Each thought that the other would be a better man in his place, and each had some excuse for not offering himself. One said that he was engaged in selling watches, and did not want to bring watches down. Another suddenly thought of an important engagement to see a man, which required him to take his departure immediately. A third said that the roof of his head was rather old and weak, and he feared that the sudden pressure would injure it. The next said that he had just had his roof all repaired up in good shape, but didn't want to go into this line of business, as it was not permitted in his policy, and he was afraid it would vitiate his insurance. Another said his mother-in-law was visiting him, and if she should see a bump on his head she would suspect him of having been on a drinking spree, and would make trouble between his wife and himself. The next said he was not at all afraid for his head, but he felt sure that it would smash the watch into smithereens, and that he should have to pay for—and positively declined to take the risk. So each excused himself, till it seemed likely that the new balance would never get tested at all. But the Chairman resolutely declared that it must and should be tested, that we ought all disregard our personal feelings and prejudices for the sake of science, and that if no one would volunteer, he should be obliged to make a selection among the assembled pates to suit his own ideas of suitability. As he spoke, the hand holding the watch began to wave in the air in a strange and promiscuous manner, whereupon a sudden panic seized the distinguished body, and in the twinkling of an eye the Chairman was left alone, perched aloft on the step-ladder, with the ill-fated balance ominously gyrating around his head.

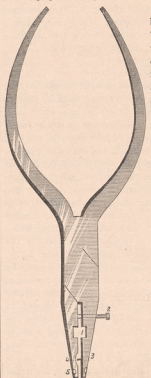
The next morning the janitor found the watch on one side of the Council Chamber, still ticking away, while on the other side was the step-ladder, crushed and totally wrecked. On inquiry, the Chairman was found confined to his bed by an extraordinarily severe cold, which rendered it impossible for him to receive visitors. He was only able to send out the following message: "Send that watch immediately to John Smith, by express, and tell the Horological Club to elect a new Chairman. I cannot consent to longer preside over a body whose members are so dead to the claims of science as the occurrences of last evening proved them to be, or to have any connection with it. From henceforth onward, let there be an everlasting gulf betwixt me and them. Amen."

Secretary of Horological Club:

Having received considerable benefit from the proceedings of the "Distinguished Body" through your valuable journal, I would respectfully call their attention to a tool for truing the arms of compensation balances, by which you can bend them and see what you are doing, and without overdoing; after riveting a new staff, for instance, I select a pair of plyers of medium length nose, and drill a hole through, quite near the end. Then cut a slot to take rim of wheel, midway between hole and slot. I cut a cavity in the lower jaw, and in the upper I drill a hole and put in a brass pin. Now, by compressing the jaws you can bend one arm without interfering with the other, the cavity mentioned allowing it to be bent, and the pressure on the hub of balance, and by inserting a screw through the upper jaw or nose, you can adjust so that there is no danger of overdoing or crippling the wheel, as is too often the case. Hoping this will benefit some fellow sufferer, I remain,

Most respectfully,

C. F. G.



1. Slots. 2. Adjusting Screw. 3. Cross Pin. 4. Cavity. 5. Hole to the Staff.

An Improved Compensated Balance Wheel.

AS is well known the linear extension of all balance springs is the same by increasing heat, but the diminishing of elasticity is disproportionate, and corresponds to the degree of hardness of the spring. This fact may explain the variations of watches which have been regulated in temperate climates when exposed to the extremes of torrid or frigid ones. A well-lardened balance spring retains its elasticity best, and in mean temperature insures the best rate; not so, however, in extreme ones, since it is subjected to a greater change. The general compensated balance wheel is unable to remedy this defect; it is apt to increase it, because its compensating arms do not, by increasing heat, move toward the center, but toward the sides. Ingenuity has been for a long time at work to overcome this evil, and has devised manifold contrivances, of which the adjunct compensation by springs, dating from 1835, and lately added compensating arms, need only be mentioned. Both contrivances do not, however, work altogether satisfactory. It may be said against the adjunct compensation by spring, that it cannot be very durable, because it causes friction, and the compensating arms locate the center of gravity outside of the balance rim.

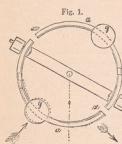


Fig. 1.

In the accompanying cut I give a new balance wheel construction which according to my opinion is free from the faults of the compensated one at present in use. It will be found by the figures that by increasing heat the compensating weights must move with a rectilinear motion to the center, and according to natural laws, the center of gravity cannot be located outside of the rim. Fig. 1 shows the upper part of the double compensated balance, as it might be called; the outer rim *a* is of brass, the inner one of steel, while the under parts of the balance, represented in Fig. 2, contains the reverse, *b* being brass and steel outside. The lower rim, in this construction, receives at *x* an outward motion, causing the compensating weights to move toward the center.—*A. Kittel, Altona, in Deut. Uhrm. Ztg.*



Fig. 2.

Watch Oil.

A GOOD watch oil should not become rancid, unreliable and mix with the free acids of the air, should remain fluid for degrees below the freezing point, and possess many other requisites which, alas, it often does not. Oil prepared in the following manner will be found to be far preferable to the many useless compounds in the market: Fill a bottle one-third full with nests-foot oil, add the same quantity of purified benzine, shake the mixture until well incorporated—that they do not separate again; then place the bottle in an atmosphere below the freezing point, and leave it there for several hours. The hard, useless fat will precipitate, more or less abundantly, according to the degree of cold. Decant the remaining fluid into another bottle, place this into a pot with water and heat to half-boiling, which causes the benzine to evaporate, and the purified oil remains in the bottle. It is well to ascertain the weight of benzine, oil, and bottle, to know whether all the benzine has evaporated. The oil may be deemed freed from it, when it has lost its smell. If the operator has a glass retort at hand he may use it to advantage; when the benzine stops dropping at the mouth, the oil may be regarded as purified. If the operator requires an exceedingly pure oil, he may expose the residue, decanted into a wide-mouthed bottle for another time to cold. Carefully skim and filtrate it. He may thus obtain the finest watch oil. To bleach it, expose the bottle, well corked, to the rays of the sun; a violet glass pane placed before it in the window, when the sun shines rather seldom, will hasten the process.

New Method of Fastening the Mainspring.

IT is well known that the stop-work in watches of cheap, and at times of costly construction, well deserves its name, because this little mechanism becomes too often the cause for the stoppage of a watch. It often happens that the necessary care has not been bestowed upon it, or its parts have become cramped by too strong a fastening.

A little watch-spring barrel was exhibited at the Exposition in Paris, in 1878, in which the spring was fastened in the manner indicated in the cut, and which appears to possess other merits, beside the security of fastening. The danger of unhooking is obviated, as well in its wound up as in its run down condition; a great advantage lies in the strength of the hook, its ease of execution, &c.

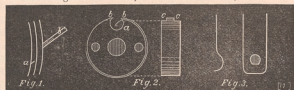


Fig. 1 is the spring barrel which possesses on the inside of the ring a rounding, *a*, intended for fastening the hook *b*; this consists simply of a piece of brass wire screwed in from the outside. Fig. 2 is the core which in place of the customary hook has a vertical perforation *a*; the two points *b b*, thus produced, are lowered by being filed down straight. Fig. 3 is the other end of the spring, provided with a curvature, to be fastened in the rounding of the spring-barrel.—*Clerk, in his Report of the World's Exposition, 1878.*

Phono-perpetual.

AMONG other objects of curiosity at the exhibition lately held at Vienna, there might have been seen a self-winding watch, better said, a watch which is wound up by the human voice—phono-perpetual—invented and constructed by the engineer August Von Soehr, and it attracted a considerable attention. The ingenious apparatus is constructed on the following principles: The winding up part is brought into contact with a membrane, which ends on the outside like a speaking trumpet, by means of a small push-spring. This membrane is set in motion by talking into the trumpet, the vibrations are communicated by the push-spring to the winding-up work, and the reverberations produced wind up and set the mechanism in motion. It has beside a head-manometer, which indicates how much of the spring has been wound up, and how many hours (or minutes) it will run before the operation need be repeated. It appears that the inventor has succeeded in bringing his phono-perpetual to a high degree of perfection. Accompanying the specimen (anchor movement, flat balance spring, compensated balance wheel) at the Exhibition was a certified document of the astronomical bureau, which rated it as first class, with rate, observed for several weeks: Mean daily rate, lying, +21.1 seconds; mean daily rate, hanging, +1.4 seconds: mean variation from one day to the other, in same position, +2.3 seconds; variation between hanging and lying, 19.7 seconds.

Honor to whom Honor is Due.

WE see by the *Journal Suisse d'Horlogerie* that the De la Rive prize will soon be competed for, and it being a matter of some interest to our trade, we condense the article for the information of many of our readers.

Prof. Auguste De la Rive, in 1841, invented the process of gilding by electricity, called galvanism; he experienced the fate of Columbus, and so many others, in having his article named for someone else, and himself buried in oblivion. He was a Genevan by birth. His claim to the invention is fully established, however, and the Academie des Sciences de Paris voted him a prize of 3,000 frs. in 1842. M. De la Rive donated this sum to the Societe des Arts, with the proviso that its interests, amounting to 600 frs. each five years, should be competed for by Genevan inventors and awarded to the inventions of most merit. It commenced in 1845, and has been kept up since.

Foreign Gossip.

A clever toy of this season's invention in London is the musical top. It is spun in the ordinary way, and, while spinning, plays musical airs accurately and melodiously.

A working clockmaker of Birmingham, England, has informed the Russian Embassy at London of an alleged nihilist plot to construct infernal machines in London, for use in Russia.

The latest charm worn by Parisians is a cat's eye locket set with three stones, one showing a faint line in the center, another the whole pupil and the third the whole pupil slightly dimmed.

The new feathers worn by the Baroness Alphonse de Rothschild were pronounced a success, and well they might be, for the stems were of silver set with a diamond, and a ribbon of diamonds bound the plume together.

The Imperial Academy of Sciences at St. Petersburg has indorsed the suggestion made some time ago by Sanford Fleming, the Chief Engineer of the Canada Pacific Railway, regarding the establishment of a new prime meridian for the world, 180° from Greenwich, and the adoption of a standard time reckoning. The English and Scottish Astronomers Royal, to whom the suggestions were also submitted gave unfavourable opinions, inclining to the Greenwich meridian as too firmly established by long usage to be deserted with propriety.

A writer who has devoted some attention to the decorators and artisans of Japan says that the worker in metals is, without exception the most artistic; but that all Japanese workmen and artists discard utterly the happy-go-lucky method in their work. They undergo a thorough training in ancient custom and precedent. Hand-books with elaborate instructions and progressive lessons are cheap and accessible to the poorest, for circulating libraries abound. From first strokes to the finished drawing, and for each class or style of design there are many elaborately illustrated works of reference.

Besancon almost monopolizes the watchmaking of France, all but 2,488 of the 444,798 watches manufactured last year coming from that town. Of the Besancon watches, 149,907 were gold, and 292,493 silver, the whole being valued at over \$4,000,000, half of which represents the labor. Nearly all these watches are sold in France. The history of the watch trade at Besancon dates from the close of the last century, when a number of workmen from the Swiss side of the frontier, persecuted for their political opinions, took refuge there and were induced to remain. Since then this industry has continued to prosper; but it was not until after the conclusion of the treaty of commerce in 1860 that the business assumed anything like its present proportions. There is a school for teaching watchmaking at Besancon; but though liberally endowed by the municipality, it is said not to be well attended.

The turquoise of New Mexico are worked at Mount Chalchuilt (the Indian name for turquoise), about 22 miles southwest of Santa Fé. The rocks in which they are found are distinguished by their white color and decomposed appearance, somewhat resembling china clay, giving evidence, according to Prof. Silliman, of great alteration due to the escape through them of heated vapor of water, and perhaps of other vapor and gases, by the actions of which the original crystallized structure of the mass has been completely decomposed or metamorphosed. The turquoise is found in little veins and nuggets, covered on the exterior with a white tuffaceous crust; but stones of great commercial value are comparatively rare, and many tons of the rock may be crushed without coming to a single specimen. The blue color of the turquoise, which, chemically, is a hydrous aluminum phosphate, is due to copper oxide derived from the associated rocks, of which the Mexico specimens contain 3.81 per cent.

Mr. Edward J. Watherson, of London, writes that goldsmiths have lately found, upon sending gentlemen's broad band rings to the various assay offices, that they were liable to the duty of 17s. per ounce, the same as that levied upon wedding rings. It may be of interest to all manufacturers of silver bracelets to know that every such bracelet is liable to the duty and to compulsory hall-marking, there being no exception in their favor in 12 Geo. II. c. 26, s. 2, or in 30 Geo. III, s. 3, 4, and 5. Manufacturers, retailers, and dealers, therefore, should clearly understand that they are liable to a serious penalty for defrauding the revenue for every silver bracelet exposed for sale upon which duty has not been paid, exactly as in the case of silver plate. They are simply in the power of a common informer. This fact should, he thinks, cause manufacturers to unite with the Goldsmiths' and Silversmiths' Free Trade Association to obtain the immediate abolition of the duties upon gold and silver plate.

It is well to know that the self-illuminating Parisian watch dials do not long retain their phosphorescence. An English chemist, Mr. Balwain, has lately received a patent in Germany, for an illuminating substance which, mixed with oil or water, can be painted on any surface. A card annotated with this substance, having been exposed to the light of day for two hours, possessed self-illumination sufficient after 26 hours to show the hands of a clock. The paint successfully resists the action of the rain and air, when mixed with oil. Dial plates of clocks, rubbed with this mixture, show the time through the entire night. The substance is said to be a mixture of lime and sulphur. A pound covers about 28 square feet.

Baron Charles de Rothschild, of Frankfurt, has recently purchased for the enormous sum of 800,000f. (\$160,000) a silver gilt cup by the celebrated Jamnitzer, which is said to be a marvelous work of art. This sum, according to the *Chronique des Arts*, is, as far as it knows, the largest price ever paid in modern times for a single object of art. The work is the center piece of a table service. It was formerly owned by Merzel, the Nuremberg banker, and was in the Museum at that place. The whole affair of the purchase was conducted with great secrecy, and had it been known that the work was for sale, a sharp competition would have been made for its possession.

It will be remembered that the artificial production of the diamond made last year by a Scotch chemist looked very much as though small diamonds had been fractured. None of the specimens were perfect. All of them were fragments. A step in advance has been made, however. Dr. Marsden has lately been able to effect the crystallization of carbon in the cubical form. Possessors of the most valuable of natural gems need not be alarmed as yet. Dr. Marsden says his crystals are so small that they are of no commercial value whatever. The fact that a perfect diamond can be produced, no matter how small, is a notable event, and when the power describing the process by which the end was attained is published it will command general attention.

The necklace now being executed by one of the first jewelers of Paris for Sarah Bernhardt is near completion, and is considered one of the finest specimens of the jeweler's art of the nineteenth century. It is of the flat shape so much worn of late years—a mere band worn round the throat of the kind called *collier de chien*. It is composed of two rows of magnificent brilliants about an inch and a quarter apart, between which a wreath of field flowers in precious stones, representing the natural colors of the rustic blossoms, seems to flow with the greatest ease and grace into the diamonds. The minute pebbles are composed of rubies, in the cornflowers of sapphires, the marigolds of topaz, and so on, while the leaves are of emeralds. No two flowers are alike, and altogether this necklace is pronounced the finest composed during this generation.

Of late some of the most beautiful mosaics, both in design and material, have been produced by Russian artists in the imperial glass manufactory of Russia, the artistic execution of which, it is asserted has never been surpassed. The piece of glass—technically called "smalts"—and comprising every possible shade of color—are wrought into minute pictures of wonderful perfection, rivaling, in fact, those of Italy. The varieties of mosaic work peculiar to the latter country are known, distinctively as the Florentine and the Roman, the former being entirely formed of pieces of stone or shell of the natural colors, and chiefly applied to floral and arabesque designs; while the Roman is made of the glass-smalts, and has so wide an application that most of the finest paintings of the best old masters have been copied in mosaic. The manufacture of the opaque glass, or smalts, required for making the little square pieces called tesserae of which the pictures are composed, is a very important one, as many as twenty-five thousand different shades of the various kinds of colored glass being produced at the Vatican.

In an account of the British occupation of Baroda, a town in India that was lately revolted, occurs the following: The British then took possession of the palace, which was known to contain immense riches in jewels and gold and silver. Down in one windowless room, reached by dark flights of steps and narrow sloping stone passages, was the jewel-room. The door was a heavy iron grating, and night and day a native officer sat in front of it with a burning torch and swords and rifles by his side. He was responsible for the safety of the jewels, which were ranged around the room in iron safes chained to the wall. The value of the Baroda jewels was believed by the populace to be fabulous, and they believed, further, that the gems were guarded by and rubies that lay in that room were worth a million and a half sterling, or about seven million dollars. Among the collection there was at least one historical gem, called "The Star of the South." It was originally brought from Brazil, and had undergone many vicissitudes in Europe before it found its way into the Gaekwar's treasury.

Workshop Notes.

To cement alabaster, melt down alum, dip the fractured parts of the article into it, and place them quickly together. When set, clean off the exuded mass.

A polish of tortoise shell or ivory is produced by rubbing the article with oxide of tin dissolved in oil or water. Rub with a piece of flannel, and gradually work dry.

The silversing fluid, called Argentine, is composed of 10 parts nitrate of silver, dissolved in 200 parts water, then add 12 parts sal-miac, 20 parts hyposulphate of potash and 20 to 25 parts precipitated chalk.

Taking water at 1.0, the specific weight of Aluminium is 2.60; zinc, cast, 6.80; do. rolled, 7.20; iron, cast, 7.00-7.50; iron, wrought, 7.60-7.80; German silver and brass, 8.55; copper, cast, 8.75; copper, wrought, 8.78-9.00; bell metal, 8.80; silver, cast, 10.10-10.47.

Lifting springs are often broken, and the watchmaker has none of the right size, and has no time to make one out-and-out. He can mend the old one and have it just as good as new, by placing the broken parts together, and binding them firmly to a piece of coal, and soldering them with 18 karat gold. It requires a strong heat and plenty of borax; then finish off nicely, harden and temper in the usual manner.

Says a correspondent to the *Revue Chronométrique*: I am using petroleum on my oil stone for the last few years, and that it serves all purposes. The stone is always clean and in working order, and those I threw aside formerly as being too hard, serve admirably when wetted with petroleum. I use a mixture of $\frac{2}{3}$ petroleum and $\frac{1}{3}$ oil, mixed, on my milling machine, and believe no other exceeds it for usefulness.

Of the great watch depot at Berlin, we publish on the veracity of the *Deutsche Uhrmacher Zeitung*, Berlin, the following astounding statistics: It appears that pawnbrokers' shops are a monopoly of the Crown, and there were, in the different institutions of that sort, on Jan. 17, 1880, on hand, 19,635 watches, on which the average loan per piece of 20 Marks, 20 Pf. was advanced; 67,612 pieces of gold and silver ware, each pawned at the average of 26 M., 40 Pf., and 2,257 articles of jewelry, pawned at the average of 155 M., 30 Pf.

For silversing brass, copper and German silver, which must have been well smoothed and cleaned, dissolve 14 grains of silver in 26 grains of nitric acid, also dissolve 120 grains of cyanide of potash in 1 litre water; mix both solutions, and add 28 grains precipitated chalk. The articles to be silvered are rubbed with this mixture. Chains, and other small articles, are placed in an unglazed earthen vessel, powdered with precipitated chalk which is then dampened and well shaken; hereupon add little by little of the silversing fluid as required.

A substitute for ivory, coral, leather, caoutchouc, etc., lately patented under the name of vegetable, is prepared as follows: Cellulose (woody fibre), from any source whatever is treated with sulphuric acid of 58° B. (—sp. gr. 1.676) at 15° C. (—59° Fahr.) then washed with water to remove excess of acid, dried, and converted into a fine powder. This is mixed with resin soap in a mortar, and the soda of the soap is removed by treatment with sulphate of alumina. The mass is now collected, dried again, and pressed into cakes by hydraulic pressure. These cakes are then cut into thin plates, which are shaped by again subjecting to pressure. By adding castor oil, or glycerine, to the mass before pressure, the produce may be made transparent. Colors may be imparted by the use of vegetable coloring agents. Facts respecting the strength and elasticity of this product are wanting.

Prof. Dufour, of Paris, has arranged a thermometric apparatus which shows the changes of temperature in a very marked way. The mere approach of the hand to the bulb will throw a needle over the whole of a graduated arc. The device consists of a bent tube, having a bulb at one end, coated on the outside with lampblack. The middle of this tube is filled with mercury, and is supported by arms nicely pivoted. Above the pivot is fixed an index needle which moves across a graduated arc, and beneath the pivot hangs a rod to which is attached by friction, a small weight, which serves to balance the needle so as to make it point to zero on the arc. When the temperature rises in the slightest degree, the heat, being readily absorbed by the lampblack on the air-bulb, drives the mercury forward and displaces the center of gravity so that the needle turns at once toward the right. When the bulb is exposed to a decrease of temperature the needle points towards the left. So sensitive is this apparatus to changes of temperature, that it was necessary, to check its sudden tipping over when exposed to a rather high heat very quickly, to place two fixed pins at convenient points beneath the tube.

It is often necessary to revarnish clock casings and other objects. We give a few recipes of easily-prepared varnishes; *Common Varnish*: 16 parts mastic, 3 parts Venetian turpentine, 24 parts sandarac, 120 alcohol. *Black Varnish*:—20 parts alcohol, 1 part sandarac, 3 parts shellac, 1 part elemi, 1 part seedlac, 1 part mastic, 1 part bonelblack, 1 part Venetian turpentine. *Red Varnish*:—50 parts alcohol, 1 part dragonsblood, 4 parts Venetian turpentine, 4 parts shellac, 8 parts mastic, 2 parts elemi. The ingredients are put into a bottle and placed near a stove, to facilitate their solution. When dissolved, filter through a fine cloth, and the varnish is ready for use. For a colorless varnish use, 1 part mastic, 2 parts bleached shellac, 2 parts sandarac, and 20 parts alcohol.

M. Conlon, the conservator of the Industrial Museum of Rouen, has, says the *Nature*, discovered a new system for transforming sound into light, which phenomenon has been the subject of a lecture by M. Frank Gerald with the Gower telephone. Two Geissler tubes are put in quick rotation on an axis. The Ruhmkorff coil of the first is worked by an ordinary interruptor, and gives the deviation of a luminous cross. The interruptor of the second is replaced by a telephone. The figure presented by the second tube projects on the first one, which is colored by uranoxide glass, and exhibits the most rapid changes, according to the height of the note delivered in the telephone trumpet. The sensibility of the changes is startling and most interesting.

Some time ago the veteran French chemist, M. Dumas, showed that silver when in a molten condition could take up oxygen in considerable quantity, and could retain that gas even after solidification for a very long period, and, perhaps, indefinitely. He has since discovered that when aluminum is heated in a porcelain vessel up to the melting point of copper or silver, and a vacuum is preserved in the vessel, a volume of almost pure hydrogen nearly equal in bulk to the metal will be obtained. When magnesium is heated in vacuum in the same way it yields a gas one and one-half times its own volume, mostly hydrogen, also, but with the addition of a variable quantity of the oxides of carbon. M. Dumas observed during his experiments with magnesium that it had been volatilized and deposited in crystals very bright and silvery and of the form of rhombohedra.

Why gold changes color.—It is a well known fact that the human body contains various humors and acids similar in action to, and having a tendency towards, bases, namely, as nitric and sulphuric acids have, viz., to tarnish and dissolve them, varying in quantity in different persons; and of which theory we have abundant proof in the effects which the wearing of jewelry produces on different persons. Thousands wear continually, without any ill effect, the cheaper class of jewelry with brass arc-wires, whilst if others wear the same article for a few days, they would be troubled with sore ears; or, in other words the acids contained in the system would so act on the brass as to produce ill results. Instances have occurred in which articles of jewelry of any grade below 18 karat have been tarnished in a few days, merely from the above named cause. True, that these instances are not very frequent, nevertheless, it is as well to know them, and they are sufficient to prove that it is not in every case the fault of the goods not wearing well—as it is generally called—but the result of the particular constitution by which they are worn.

Discoveries in chemistry have hitherto resulted chiefly from the application of the analytical method, a knowledge of the composition of compound substances being obtained by simply decomposing them; and it is by this method that the number of known elementary substances has in recent years been so considerably increased. The other method of chemical research—namely, by synthesis—has not yet been so productive of fruit, probably owing to the fact that it is more difficult to build up than to pull down. There cannot be a doubt, however, that in the chemistry of the future the synthetic method is destined to play a more important part than it has hitherto done. Considerable progress has been made in this direction of late years. Analysis has shown that some of the loveliest and most valued of nature's crystals—the ruby, the sapphire, and the diamond—have been formed in nature's laboratory out of the commonest materials; and, by synthesis, these raw materials have now, in the chemist's laboratory, been transformed into those precious stones. Carbon has, in the hands of Mr. Hannay, of Glasgow, become the diamond; while clay, or rather its chief ingredient, alumina, with the addition of a little coloring matter, has been transformed by MM. Feil and Freney, of Paris, into the ruby and sapphire. Hautefeuille has similarly succeeded in artificially producing crystals of albite, orthoclase, and quartz, and the difficulty attending such operations may be judged from the fact that it was only after keeping certain substances at the enormous temperature of 1000° C. for a month that the latter chemist succeeded in his synthesis.

Trade Gossip.

Handsome chatelaine watches are of silver or of tortoise shell.

New bangles have two tiny Japanese fans crossed on the top.

Owls' heads in cut jet, with yellow eyes, make fanciful brooches.

New ornaments for the hair are silver fans, arrows, daggers and pendants.

The newest silver earrings are faceted silver balls not bigger than a buckshot.

Clock lamps that tell the hour and give a faint light all night are offered for sale.

Pretty new bracelets are of white kid, painted by hand and mounted with gold.

Pretty bangle rings have stars of crescents, studded with small turquoises as pendants.

Fred G. Thornbury has been admitted to an interest in the firm of C. G. Alford & Co.

The newest fans have the pearl sticks covered their entire length with marabout feathers.

E. Beckwith, formerly with L. H. Sanderson, has commenced business on his own account.

The retail jewelry trade is said to be nearer out of debt than at any time before in many years.

A. L. Farrington, Foreign buyer for Le Boutillier & Co., sailed for Europe in the *Britannia*, January 1st.

Mager, Lehman & Kohn, a firm of jewelers, doing business in this city, have made an assignment.

The old-fashioned side combs just now in vogue are set with brilliants, inlaid with plaques of silver or gold.

Joseph Fahys, contemplates erecting an extensive factory at Sag Harbor, N. Y. for the manufacture of watch cases.

A. H. Smith's jewelry store at Wilton, N. H., was recently destroyed by fire. His stock was a total loss. No insurance.

William Bardel, of Heller & Bardel, will sail for Europe in a few days with a view to securing novelties for the coming season.

D. P. H. Marshall, of Mount Sterling, Ill., keeps a jewelry store and a restaurant. A traveler might go farther and fare worse.

The opal mines of Queensland, Australia, bid fair to rival at no distant date the far-famed depositories of that gem in Hungary.

Cats' heads in diamonds, with topaz eyes, a little pink coral tongue blue enamelled collar around the neck, are the latest fancy in jewelry.

"Tortile" is the newest ornamentation for jewelry. It is exceedingly neat and artistic and the latest production of Mr. Joseph Chatellier.

James Berkeley, with Messrs. Hall, Nicoll & Granbery, sailed for Europe, in the *Bothinia*, Dec. 29th, in search of novelties for the spring trade.

We fear that Bob Ingersoll has been tampering with the city church clocks. They are beginning to express a disbelief in both time and eternity.

Samuel H. Levy and J. W. Friedman, who have for many years represented the firm of L. & M. Kahn, have been admitted to an interest in the firm.

The manufacturers of machine-shop tools, say that their business is more satisfactory than ever before. Prices of these articles have advanced 30 per cent.

A fire occurred on the evening of the 15th of January, at No 4 Cortlandt Street, and the stock of the Waterbury Clock Co. was slightly damaged by water.

Mr. Beguelin, of the firm of Cross & Beguelin, is one of the happiest men in the Lane. It is a fine, bouncing boy, and a perfect image of his paternal ancestor.

Shreve, Crump & Low, of Boston, have just perfected an ingenious attachment, for winding, setting, regulating and starting French clocks, that will, doubtless, become popular.

Henry Heitzelman, of Dubuque, Iowa, was recently robbed of a number of gold and silver watches, and a quantity of jewelry, a reward of \$200 is offered for the recovery of the same.

E. G. Webster & Bro., manufacturers of electro-plate goods, have moved into their new factory, corner of Atlantic and Fifth avenues, Brooklyn, where they have increased manufacturing facilities.

Noah Mitchell, who has been abroad for some time in accordance with the directions of his physician, is now at Nice, and, we are happy to state, is rapidly recovering his health. He will return home about June.

Joseph Lederer & Co., of Chicago were burned out, January 6th, resulting in the failure of the firm, and confession of judgment for \$17,000. The circumstances attending this failure are regarded as suspicious.

John Hoffman, late of Dunmore, Pa., whom we recently denounced for obtaining goods under false representations, was lately arrested in this city on complaint of one of his victims. He was kept in jail for several weeks.

The jewelers of Clinton, Iowa, have adopted Boynton's price list for repairs. C. S. Raymond is entitled to the credit of having brought about this wholesome condition of affairs. Let other places go and do likewise.

Great complaint is being made at the tardiness displayed by the assignee of M. Kronberg, of Chicago, in settling up his estate. Nearly all the foreign creditors have received their dividends, and the Eastern creditors are anxiously awaiting their turn.

Chas. Magnus, has been admitted a partner in the house of Philip Bissinger, the name of the firm will hereafter be known as Philip Bissinger & Co. We congratulate Mr. Magnus on his good fortune in associating himself with so eminent a gentleman.

Van Moppes & Marx, diamond importers of this city, import direct from their cutting and polishing establishment in Amsterdam. They are also interested in several mines in Africa, which gives them unusual facilities for presenting choice goods to the trade.

By a recent fire in Williamsburg, a portion of the stock of the E. N. Welsh Clock Co. was injured to a slight extent. The report printed in the daily papers to the effect that the Ansonia Clock Company was a sufferer by the same fire, was entirely erroneous.

The firm of Morgan & Heady, manufacturing jewelers, of Philadelphia, has been dissolved, Charles B. Heady having purchased all the right, title and interest, of Mr. Morgan the retiring partner, Mr. Heady will continue the business under the old firm name.

The latest style in ladies' watches is in red gold, quite plainly finished, or else with an ornamental monogram. If a very elaborate watch is desired, it is richly carved or has raised work with enamels and diamonds. The chatelaine is very short and is chosen to match the watch.

The semi-annual meeting of the Wisconsin Retail Jewelers' Protective Association will be held February 9, at the Kirby Hotel, Milwaukee. Mr. W. N. Boynton, President of the U. S. Jewelers' and Watchmakers' Guild, will be present, and a large attendance of Wisconsin jewelers is expected.

A young man named Clarence L. Gordon, employed by William Moir, of this city, was recently detected in robbing his employer. Gordon slept in the store, and had opportunity to steal jewelry which he distributed among a number of dissolute women. He has been arrested and some of the goods recovered.

Joseph Muhr, of H. Muhr's Sons, and Sol. Kaiser, traveling salesman for the same firm, having long withstood the onslaughts of Cupid, have at last succumbed. Mr. Muhr will shortly leave to the hymenial altar, Miss Ella H. Froelich, of this city, while Mr. Kaiser inamorata is Miss Jennie Kohn, of Chicago.

The house of B. Kahn & Co. has been reorganized by the admission of Mr. Jacob Kahn, son of the senior member of the firm, who has been with the house a number of years. The firm will hereafter be known as Kahn, Hanover & Co., Mr. Henry Hanover, the former junior partner, receiving recognition in the title of the firm.

The vacancy in the management of the jewelry department of Kearney & Schwartzchild, by the retirement of Mr. A. E. Shader, is to be filled by Mr. A. N. Britton, who has for years represented the firm on the road, and of late especially in the far west. Mr. C. F. Bevan, assumes Mr. Britton's responsibility on the road.

According to statistics recently presented to the Board of Trade of Newark, there are now in that city, seventy-two jewelry firms, employing 2,335 hands, paying out \$1,964,019 in wages yearly, having a total product of \$4,632,827, and, with silver and gold refining and smelting added, producing a grand total valuation of \$13,427,427.

The Providence Jewelers' Club held a meeting in that city on the evening of January 10th, for the purpose of perfecting arrangements for the reception of the New York Base Ball Club. A return match game will be played between the Providence and New York Clubs, sometime during the summer. It behooves the boys to get themselves in readiness for a trip to Providence.

Trade Gossip.

Aiken, Lambert & Co. recently lost one of their sample trunks on the Louisville & Nashville Railroad by the burning of a baggage car. The goods were insured by Geo. W. Smith & Hicks, 26 Pine street, under a special form of policy, covering goods in the hands of travelers. The amount insured was paid within forty-eight hours after presentation of proofs of loss.

Zacharias & Green, of San Francisco, have had their stock attached by local creditors. According to the laws of California, the first attachment locks up everything, and eastern creditors will be left out in the cold. This is the third time this house has been in difficulty, and it is suggested that they have achieved sufficient distinction to enable them to retire for the best interests of the trade.

A number of the jewelers in Maiden Lane, have been in the habit of employing a private watchman to look after their places at night, entrusting him with the duplicate keys of the outer doors. Recently, one of the jewelers had occasion to visit his place of business early in the morning, when he found the door open and the watchman lying drunk on the floor inside. His services were speedily dispensed with.

The plated ware associations held a meeting in this city recently, when a reduction in prices was agreed upon. In hollow ware the reduction is about ten per cent. and in flat ware, about fifteen per cent. A year ago there was a considerable advance in the prices of raw material, but this having subsided, and prices returned to their normal condition, manufacturers are able to make corresponding reductions in their prices.

A patent has recently been issued to Nils Friis and George N. Penn, for an ingenious device for protecting the watches and pocket-books of travelers from pilfering companions. By a simple contrivance attached to the watch, an alarm is sounded if anyone attempts to disturb it. A pocketbook can be fastened to the alarm and receive similar protection. The device can be used with equal advantage at home or while traveling.

Alexander Rodanow, has been arrested by officers of the Post office Department, charged with using the mails for fraudulent purposes. It is alleged that Rodanow represents himself as agent of the Rodanow Manufacturing Company, of Boston, with a capital of \$2,000,000, for manufacturing watches, which are advertised to be sold at a great discount. He appears to have advertised in English, Indian and Australian papers to sell silver watches, and sent to his victims a worthless article. He did not advertise in the United States.

George H. Ford, of New Haven, has been appointed Commissary General on the staff of Governor Bigelow of Connecticut. Mr. Ford is one of the leading jewelers in New Haven, has long been identified with the militia, and this appointment is a just recognition of his business standing and social position. His elegant form and martial bearing, together with his brilliant uniform, will lend an attraction to the Governor's appearances that could be obtained in no other way.

The business men of North Attleboro, Mass. have formed a Board of Trade, and chosen the following officers: President, H. A. Daggett; Vice-Presidents, H. F. Barrows, H. M. Richards, J. D. Lincoln; Secretary, F. B. Byram, Esq.; Treasurer, E. R. Price; Directors, B. S. Freeman, O. M. Dwyer, C. E. Richardson, A. E. Coddling, T. G. Sandland, F. M. Whiting, E. E. Barrows, S. E. Fisher, Geo. B. Whitney, R. Knapp, W. H. Wade, J. D. Richards and C. S. Colbath.

A well dressed young man, recently entered the store of a Broadway dealer in clocks and mantel ornaments, and asked permission to occupy a seat for a few minutes, stating that a friend had agreed to meet him there and make some purchases. He was permitted to sit near a counter on which were several costly clocks. After a time he left the store unobserved by the clerks, carrying with him an ebony clock valued at \$150. The robbery was reported at Police Headquarters, and from the description given of the thief he is believed to be a well known shoplifter.

A great variety of jewelry is worn with evening toilets. Pins are employed to fasten down shell-shaped trimmings on the lower part of sleeves, to keep a flower in place, and for many such purposes. Diamond hair ornaments are in very general use. The most costly jewels are in perfect imitation of black spiders, crabs, and many such repulsive creatures. A large, ugly black spider is considered an exquisite parure when its eyes are of rubies, its body of pearls, and when its dreadful legs are covered with diamonds. All kinds of animals, such as elephants, Spanish mules, bulls, and goats, are faultlessly imitated. Bracelets and necklaces are ornamented with every kind of animal. Another novelty is a small brooch fan of tortoise-shell and feathers, made in perfect imitation of the large fans now in vogue.

A Westfield show window presents a bright "take off on the way some shopkeepers are mixing up trade. Side by side are calico, flannels, vegetables, crockery, silverware, iron cooking utensils, salt fish, fresh and canned meats, toys, confectionery, jewelry, watches, ready made clothing, hoisery, hardware and patent medicines. Everything is appropriately labeled, mostly in the way of puns, as, for instance, the extremity of a dried herring is marked "a tale of the sea," and a wooden faucet "game woodcock."

The day before New Year's, Miller Bros.—James W. and Isaac M. Miller—were surprised at their factory by a committee of their employees, who presented them with an elegantly engrossed and framed set of resolutions, expressing their high regard for them as business men and as employers. Some of the men have been in the employ of Miller Bros. upwards of twenty years, and the relations existing between them are of a most friendly nature. The resolutions are handsomely framed in bird's-eye maple, inlaid with ebony. There were complimentary and feeling speeches made on both sides at the presentation, and the event was one long to be remembered by all present.

A novel robbery was perpetrated on the jewelry establishment of T. B. Byrner, No. 513 Broadway recently. Mr. Byrner, was in the habit of displaying valuable goods in his show window, which projected beyond the line of the building. Some thieves cut away the bottom of the window at night, leaving only a covering of velvet on which the goods were placed, the portion cut away being held in place by a button. When the goods were placed in the window next day, the thieves removed the bottom, allowing some of the goods to fall to the sidewalk. They grabbed a few, but the clerks in the store saw the operation and saved most of the goods. Four persons were arrested for the robbery and held to answer.

Messrs. D. D. Chandler and A. E. Shader, who have for the past six or seven years been in the employ of Messrs Kearney & Swartchild, of Chicago, have formed a copartnership under the name of Chandler & Shader, for the purpose of conducting an exclusively wholesale jewelry business. Both gentlemen are well known to the wholesale and retail jewelry trade. The former as traveling representative for Messrs. K. & S. and the latter as manager of the jewelry department of the same firm. They start in with an experience of years and a thorough knowledge of the business, and we hope will meet with success in their new undertaking.

The Jewelers' Protective Union held its third annual election in this city on the 17th ult. Mr. Enos Richardson was elected to fill the position on the Executive Committee left vacant by the death of Thomas Slater. Mr. William R. Alling was re-elected President; Ira Goddard Secretary and Treasurer. The Executive committee now stands, L. A. Parsons, Enos Richardson, S. Oppenheimer, Wm. Smith and L. M. Miller. All applications for membership will hereafter be reported upon by the Executive Committee. The Association resolved to levy an assessment of five dollars annually upon such certificates of membership issued. Annual meetings hereafter will take place on the first Monday in March.

A report has been going the rounds to the effect that a watchmaker in Copenhagen has invented a clock that does not require to be wound. The same thing has been accomplished by A. S. Crane, a watchmaker in Newark, N. J. In his clock the only motive power is a magnetic current, and there is, therefore, no winding to be done. The magnetic part of the clock consists of two pairs of electro-magnets and a rocking armature, the latter acting directly on the escape wheel to drive the train. The entire method of applying the current to the magnet Mr. Crane keeps a secret. The pendulum is not in electric connection at any time, being a gravity pendulum. The main point of excellence claimed for the clock is the arrangement for controlling the course of the current, so that when the pendulum separates the contact points, no spark is called out. The clock has been running two years, and is pronounced a success by all who have seen it.

The old firm of Carter, Hawkins & Sloan, has been dissolved by mutual consent, Mr. Hawkins retiring from the business. The firm will hereafter be known as Carter, Sloan & Co. Mr. Sloan will continue to have entire charge of the business management of the firm, assisted by Mr. Hastings, who retires from the road, while Mr. Howe will take Mr. Howkin's place in charge of the factory. Mr. Howe has acquired a thorough knowledge of the requirements of the trade that will be of great advantage to the firm in the production of novelties. He also has great executive ability, which will find full play in the active management of the factory. Mr. Hastings is now making his farewell trip, but hopes to maintain in his new position those pleasant relations with the trade, which he formed on the road. Mr. Carter, the veteran head of the firm, will hereafter maintain his *otium cum dignitate*, looking in occasionally to see that the "boys" are conducting matters in the good old style that gave to the firm the enviable reputation it now enjoys.

Jewelers' Circular and Horological Review.

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THE

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NOTICE TO SUBSCRIBERS.

The Twelfth Volume of this Journal began with the February number. Those of our readers whose term of subscription has expired, and who have been notified by our usual circular, will confer a favor by responding as promptly as possible, as all subscriptions terminating with the last volume will be discontinued if not renewed.

Recent Failures.

A recent disgraceful failure in Chicago, another in St. Louis, and several small ones in other localities, may be accepted as evidence that there is a class of dealers who will fail under even the most favorable conditions. Indeed, the indications are that they go into business with the deliberate intention of failing at the first favorable opportunity, and swindling their creditors to the fullest extent possible. During the past year business has been remarkably good, and dealers possessed of ordinary business capacity and common honesty have not only done well, but have paid off some of their old indebtedness. For a dealer to fail when business is good is an impeachment of either his integrity or his capacity. There may be circumstances that will go to mitigate the disaster, but the man who fails in good times ought to be able to show his creditors a clean record, otherwise he will be looked upon with suspicion, and his honesty questioned. Most of the failures that have occurred of late have a flavor about them that is far from savory. When dealers come to New York and buy liberally from the manufacturers and jobbers, representing that their affairs are in a flourishing condition, and the demand active, and then come on again within six months and ask to compromise their indebtedness for twenty-five or thirty cents on the dollar, there is naturally a suspicion that "there is something rotten in Denmark." Yet this is just about what has been done in one or two instances of late. There is no doubt but the parties failing laid

a deliberate plan to swindle their creditors. After getting all the goods they could without exciting suspicion, they have made way with their stocks, and now have the impudence to come forward and offer a picaresque compromise. It is unfortunate that there is not some way of punishing these scoundrels as they deserve, but they are generally sharp enough to manage their affairs so as to avoid a criminal prosecution, and so escape by giving up whatever they choose.

Manufacturers and jobbers are responsible for this condition of affairs to a great extent; not responsible that their customers are dishonest, but they have left the gates of trade open so that dishonest men get in. In the first place, they are not sufficiently discriminating in giving credit. Anyone with a plausible story can obtain goods from some jobbers and manufacturers without a cent of cash being demanded. Let him present a few business cards of responsible firms, or exhibit half a dozen paid bills, and few questions are asked, but he is at liberty to order what he pleases. Of course, this is not the general practice, but there are enough who do business in this careless manner to make it an object for dishonest men to set up as jobbing jewelers, and to try their sharp practices on the trade. Private settlements with insolvent debtors have also tended to increase the number of failures. Those who make a business of failing, or who go into business with that purpose in view, have learned by experience that the jewelry trade is the easiest of all the industries in which to effect a compromise. And it can be done at a less cost to the insolvent debtor than in any other branch of business. In nine cases out of ten, when a dealer comes to New York to compromise with his creditors, he does so on his own terms. There may be a little blustering opposition at first, but ultimately he is allowed to have his own way, pay what he pleases, and resume business with a clean slate. Occasionally an effort is made to get something more out of the estate of the insolvent, but for one case where the legal remedy is sought by the creditors, a dozen are compromised privately, and the facts are scarcely known except to the parties in interest. The facility with which dishonest men can obtain goods on credit, and with which they can compromise their indebtedness when they choose to declare themselves insolvent, is a standing temptation to rogues, and costs the trade many thousands of dollars every year.

We presume that so long as there is so much active and unwise competition in the trade as there is at present, there will be little restraint imposed on present methods of giving credit. Manufacturers and jobbers seem to have made up their minds to take great risks, and we presume they will continue to do so in spite of the advice of the best men in the trade. So long as they take such risks they must stand the consequences. But such a thing as a private compromise should never be heard of. If a debtor becomes insolvent, but is honest in his settlements, the fact of his insolvency will hurt him but little if known to the whole trade; if he is not honest in his failure or his settlement, the whole world should know it, that he may be avoided in the future. In every case of insolvency the law should be invoked and permitted to take its course. The results will be quite as good to the trade, from a financial point of view, and it will gain greatly from the decreased number of failures that occur. If it comes to be generally understood in the trade that the man who fails has to settle his affairs in court, and in accordance with law, that fact will

have a tendency to make men more careful in conducting their business, while the rogues will be deterred from prosecuting their sharp practices. When a man is confident that he can go to his creditors and get released from his indebtedness for 25 or 30 cents on the dollar, it is a constant temptation to him to wipe out old scores in this manner, and commence over again; but if he knows that in case of his becoming insolvent, his affairs will be carefully investigated and his estate judicially administered upon, he will use every endeavor to maintain his credit. We have not the slightest doubt but some of the failures recently compromised were fraudulent in every respect, and had a judicial examination been ordered, the swindling debtors would have been in a fair way to do the State service in State Prison. But a private compromise with their creditors not only relieved them from this unpleasant predicament, but left them in full possession of their ill-gotten gains, and free to resume business again. Further, they find that their credit is comparatively uninjured, and even those whom they have swindled will trust them again, for fear that if they do not sell to the delinquent some one else will.

Retail dealers who do an honest business, paying dollar for dollar of their indebtedness, are placed at great disadvantage by this system of compromising with insolvent debtors. They cannot compete with men who do not expect to pay more than twenty-five cents on the dollar, and unless they can do this, they cannot control the trade. Honest dealers would be glad to see the credit lines drawn tighter and all compromises done away with. It might work an occasional hardship, but the general results to the trade would be beneficial. Let it once be thoroughly understood that insolvent debtors must answer for their shortcomings in the legal tribunals, and the professional failers and sharpers will retire to other more promising fields, and the atmosphere will be all the purer for their departure. Respectable dealers will then have an equal chance in honest competition, while manufacturers and jobbers will have a much better chance of obtaining their just dues. Private compromises are the bane of the business, offering a premium to fraud, and discouraging legitimate trade.

Jewelers' Profits.

ELSEWHERE we print a communication from "A Traveler who Makes and Sells His Own Goods," addressed to the Jewelers' Associations of the country. The writer takes these Associations to task for resolving not to buy of those jobbers who do a retail business at wholesale prices, thereby underselling the retail dealers on their own ground and destroying their trade. "Traveler" also claims that the jobbers have a perfect right to sell to outsiders, fancy goods dealers and hardware merchants, thus placing them in the field as active competitors of the regular retail dealers. In short, "Traveler" thinks the Associations all wrong, and claims that the remedy for all the evils complained of is for the jewelers to abandon their special trade as such, and set up in business as general dealers, selling such goods as are in constant demand, turning over their stocks quickly at low profits; in fact, not to make jewelry a specialty, but to handle any and all kinds of goods from which a profit can be made. He affirms that the reason why retail dealers cannot compete with outsiders who handle jewelry, is because the latter is content with small profits, while the regular dealer insists upon large profits. Probably "Traveler" looks at the trade through special spectacles, adjusted particularly for his peculiar vision. As one who makes and sells his own goods, he is at perfect liberty to lay down rules for his own guidance, but it is hardly probable that their general application would be beneficial. If he has a specialty to which he devotes his time in manufacturing and selling, he can afford to sell for "small profits and quick returns." So can the manufacturers of any specialty for which there is an active demand. But this is not true of the manufacturers, jobbers and retail dealers in general lines of jewelry. The manufacturer of a specialty can perhaps afford to sell it for ten per cent. above the cost of manufacture, because his expenses are con-

fined to the production of the one article that he sells. Not so with the general manufacturer. In the first place, a large sum must be invested in the plant for the manufacture of full lines of jewelry; there are designers to be employed, who must search for novelties; their ideas are worked out by skilled mechanics; the cost of production therefore, includes much besides the material and workmanship devoted to the production of any particular article. Then, too, all goods produced do not hit the popular taste, and prove a dead weight on the hands of the manufacturer. There are bad debts to be accounted for, interest on money invested, expense of selling the product of the factory, unsalable stock, and many other items, all of which must be paid for from the profits on the goods actually sold. Therefore if a manufacturer obtains fifty per cent. above the cost of producing certain articles, when he comes to balance his accounts at the end of the year, that profit is whittled down to the same average profit that he obtains upon his entire product, and if this average will equal ten per cent. he will be very well satisfied. During the dull years preceding 1880, we knew plenty of manufacturers who would have been glad to have turned over their factories and facilities for selling to anyone who would have guaranteed them legal interest on the actual money invested, leaving the matter of profit entirely out of the question.

Jewelry cannot be handled as can a stock of dry goods, as our correspondent seems to think. Dry goods are standard articles, for which there is a constant and imperative demand. A dealer can, therefore, depend upon disposing of his stock within a reasonable period, and can afford to be content with small profits, for he invests his money in another stock and soon realizes another profit. With jewelry the case is very different. Articles in this line are not among the necessities of life; they are classed among the luxuries. It is only when money is plentiful that there is an actual demand for them. In a period of business depression they have no sale. If a man owns a thousand barrels of flour that he wishes to realize on, let him put the price down five cents a barrel below the market price and his stock would be snapped up immediately. But if he should happen to have a stock of jewelry instead, he might reduce his prices twenty-five or even fifty per cent. and the public would not touch it. It requires a special training to enable men to handle jewelry successfully, and to mix it up promiscuously with dry goods, groceries, etc., is to rob the trade of its distinctive and characteristic features, and degrade it from its rank from among the fine arts to a mere dickerer occupation. There are certain things, some of which are suggested by our correspondent, that may well be associated with the jewelry business, and from which dealers might make some profit. We have frequently made this suggestion, and it has been successfully adopted by some dealers; but we protest against jewelers being placed in the category of promiscuous dealers in all sorts of things foreign to the business, simply because there may be a little profit in the sale of them. Besides, to make promiscuous dealers of the trade would be to destroy the art of watchmaking and repairing, which now constitutes a legitimate part of their business. The public would hardly be satisfied with this arrangement, but is very well content with matters as they now are. Owners of watches would scarcely be satisfied to turn them over for repairs to a dealer in dry goods, dried codfish, or a general assortment of hardware. Our correspondent evidently compares the prices charged by jewelers on their full lines of goods with what it costs him to produce a single article. In this he makes a great mistake, and places the trade in a false position. We venture the assertion that the profits made by the jewelry trade do not average higher on the capital invested and the amount of stock handled, than do his profits on a single article. We might ask him in this connection, to give us a list of the men who have attained wealth selling jewelry; we will guarantee to quadruple the number with men who have made large fortunes selling dry goods or hardware. The letter of our correspondent contains some suggestions which may do good to some dealers, and we therefore give it place, but disagree most decidedly with his general views.

The Price of Pearls.

FOR a long time there has been such active competition among the stone men in the sale of pearls used for manufacturing purposes, that prices have been slaughtered. The competition has been most active in half pearls in sizes from 6 to 14, used for setting, and it may be fairly said that there has been no "bottom price" for them. Manufacturers have not known how the market would be from one day to another, and were never sure but their competitors bought for less than they could. This has been exceedingly annoying to them, for they could not determine what prices to affix to their goods containing pearls. They might buy at a low rate, put their goods on the market at a fixed price, and when they came to duplicate them, find that pearls had gone up, or that some one else was buying cheaper than they, and, consequently, selling the manufactured article at a less price. There has also been lacking among the stone men a uniform standard for sizes of half pearls, and what was No. 6 with one dealer might be No. 7 with another. This was also embarrassing to the manufacturers, leading to much confusion in their production of pearl goods. At last the stone dealers have come to their senses, and fully realize that a cut-throat policy is neither rational nor profitable. After much consultation, the dealers, with two or three exceptions, have agreed both upon a standard of sizes, and a minimum scale of prices for half pearls. An agreement has been signed by them, binding them, under penalty of a forfeit of a considerable sum, to maintain the scale agreed upon. A slight advance is made upon what have been considered as ruling prices, but not an advance that will materially affect the cost of manufactured goods into which pearls enter. The schedule adopted is more to maintain a uniform minimum price for half pearls, and to put an end to the unbusinesslike competition that has prevailed, than to advance values. Manufacturers will be glad to know when buying, that they are getting the best market rates, and not be apprehensive that some favored competitor is buying cheaper.

It is intimated that if any serious advance in prices is made by the stone men, the manufacturers, who consume the half pearls in their settings, will turn importers. This would be scarcely practicable, unless they became large buyers, and thereby obtained every advantage the European markets afford, as the stone men now do. Some manufacturers are apprehensive that an advance in the cost of pearls will make confusion in the prices of their manufactured goods. They have got out certain lines of pearl goods upon which the prices have been fixed, based upon present prices of pearls. They claim that it will be impossible for them to advance the prices of their goods to correspond with the advance in the cost of pearls. But we are assured by the stone men that they do not contemplate putting up prices to an extent that will interfere with manufactured goods. All they want is a living profit on their business, which is merely a fair rate of interest on the money that they have invested in it, and the increase in prices they propose for half pearls will scarcely be perceptible to manufacturers, many of whom have all along been paying full as much as the schedule calls for. The combination, if it is proper to call it so, is simply to prevent the indiscriminate undercutting in prices in favor of a few manufacturers that has heretofore been indulged in. For our part, we are glad to see that the stone men have come to an understanding in this matter, and wish that an agreement, similar in character, could be extended to some other branches of the trade. Competition, legitimately followed, is unquestionably good for trade, but where it degenerates into a cut-throat game, and dealers run a muck with each other, slaughtering prices and ignoring the important item of cost, it is demoralizing in all its tendencies. Not only does the person who sells below cost lose money, but everyone else in the trade is disastrously affected by his practices. He establishes a precedent in low rates that has to be followed by others, and the result is a loss to all. In the jewelry trade a fair margin of profit must be maintained upon goods sold to cover the cost of manufacture, and the expense of selling. They

cannot be hawked about like an old stock of antediluvian chromes, without inflicting serious loss upon some one. We are glad to welcome any movement that has a tendency to redeem the trade from the demoralizing influences that crept in during the hard times.

Pawnbrokers Enemies to the Jewelry Trade.

PAWNBROKERS constitute one of the evils that afflict the jewelry trade. All of them do more or less of a business in jewelry, and are generally only too glad to obtain a stock of goods to lend to them an air of respectability. The very nature of their business makes sharpeners of them; they thrive upon the necessities of their neighbors. When the times are hard, work scarce, and the poor suffering, the pawnbrokers thrive best. Their propensity to deal with the criminal class is so well known, that nearly every pawnbroker is regarded by the police as a receiver of stolen goods. Certain it is that whenever a robbery of jewelry occurs, unless the goods are immediately recovered, they are sure to find their way to some pawnshop. Some of them are known to be the aids and abettors of burglars, laying out work for them to do, and advising and counseling them as to what "crisbs to crack" and the best way to do it. It may be taken for granted that nearly every pawnbroker is, from the nature of his calling, a natural enemy to the jewelry trade, mainly because he furnishes the facilities for concealing stolen goods, and disposing of them for the benefit of himself and the thieves. This being well understood, it is surprising that members of the trade can be found who are willing to contribute to the success of the pawnbrokers. Complaints come to us quite frequently that travelers for manufacturing and jobbing houses, after selling all the goods they can to the regular dealers in a city or town, call upon the pawnbrokers and stock them up. The pawnbroker is willing to buy liberally, for his stock of legitimate goods serves as a cover for his less regular transactions. As he relies on pawnbroking for his profits, he can afford to, and generally does, sell his stock of jewelry at cost, thus underselling the regular dealers. By keeping a stock on hand, he is enabled to mix with and so work off goods that came to him through illegitimate channels. Legitimate dealers cannot be expected to bear up under competition of this kind. They expect to pay 100 cents on the dollar for their goods, and this they cannot do if they have to compete with stolen goods, or goods that are offered at manufacturers' prices. If, under such competition, the retail dealer is made a bankrupt, those manufacturers and jobbers who have encouraged the illegitimate trade should not complain when they are asked to compromise for twenty cents on the dollar. This practice of travelers is unfair to the retail trade, robbing them of the patronage that is necessary for their existence, and they protest against it in vigorous terms. Manufacturers and jobbers will best serve their own interests by maintaining the integrity of the retail trade, and setting their faces against selling to pawnbrokers. But there are some sneaks in the trade who had rather make a dollar through a pawnbroker's back door than five dollars legitimately in open fair dealing. To such as these our appeal will be in vain, but we urge upon the respectable portion of the trade to forbid their travelers dealing with pawnbrokers. Give the retail dealers at least an even chance for their lives.

The Proposed Prime Meridian for the World.

THE Imperial Academy of Sciences at St. Petersburg is reported to have indorsed the suggestion made some time ago by Mr. Stamford Fleming, the distinguished Canadian engineer, for the establishment of a new prime meridian for the world 180° from Greenwich, and the adoption of a standard time of reckoning. The English and Scottish Astronomers Royal, to whom the suggestions were also submitted, give unfavorable opinions, it is said, indicating to the Greenwich meridian as too firmly established by usage to be abandoned with propriety. The question of selecting an international prime meridian is by no means unimportant, but if it is to be 180 degrees from Greenwich it would be extremely difficult to force it into common use. The 180th meridian cuts the Pacific Ocean into two

nearly equal parts, but it passes through no island of any magnitude or widely known, and is far from any astronomical observatory or commercial center. In fixing the zero point of longitude for the world it is evidently of greatest moment that some point be taken which is most widely known, especially to navigators, who more than any other class of men refer to it. Every meridian has as much natural right to be the standard as any of its fellows. But the consideration just named is entitled to decisive weight and has led to the general adoption of Greenwich, which most nearly fills the conditions required by those most engaged in measuring terrestrial distances in east and west lines.

The old standard meridian of Ferro, or more properly the meridian 20 degrees west from Paris, falling a little beyond Ferro, the most westerly of the Canaries, both because of its being familiar to early European navigators, and because it ran west of all the land surface of the Old World, has been generally adopted as the most appropriate boundary between the eastern and western hemispheres. But when the control of the ocean passed from Spain and Portugal to the English the convenience of the maritime world and the fact that England became the leader in geographical and cartographical work, overruled theoretical and historical considerations in fixing the starting point of longitude. It seems very doubtful, therefore, whether any international legislation can alter the present prime meridian of the world, which has been established in deference to the necessities of commerce and navigation.

But the discussion of this question is timely. The objection to Greenwich as the international standard, if based on any ground, is based apparently on silly national prejudice, which has operated, unfortunately, to prevent concert in settling a point of importance to geographical and cartographical science, and we know of no geographer who has urged a change. For purposes of measuring distances on parallels of latitude within national limits, Russia, China and the United States are the only Powers whose territory is so expansive as to require reckoning by longitude instead of by miles, and for such purposes they can select their own prime meridians. For the United States to accept the 180th meridian, which passes through no point whose bearings are fixed in the popular mind, would be to throw our geography into confusion, and the great mass of the Russian population certainly have a better idea of the location of the Greenwich line than that of the zero point now proposed. If the agitation of the question took the shape of arguing the general adoption of the prime meridian most used, and the conformable standard of time for the world, it would accomplish good results and be much more likely to meet with substantial success.

"The Rodanow Watch Company."

SOME time since we printed an article descriptive of the sanguine views put forth by an imaginative individual, whom we called Mr. Aristarchus Plumbago, in his efforts to establish a watch company, for the purpose of making cheaper watches than anybody else. According to Plumbago, there were "millions in it," and all he wanted was the necessary capital. The article was a good natured travesty on the statements put forth from time to time by visionary individuals with the hope of extracting funds from the pockets of capitalists. We had no idea that such a character was soon to turn up in our midst, or, rather, in Boston. But he has, and his name is Rodanow, instead of Plumbago. At least, he was Rodanow when the officers of the Post Office Department arrested him, but after they got him in jail, he claimed that his name was Dr. Edward Nathan-Ganz, and the officers and his friends have been actively employed to find out which is who. The story, briefly told, is as follows: Numerous foreign letters came to the Post Office for Alexander Rodanow, many of them registered, containing money. There also came letters to the Mayor and the Postmaster inquiring as to the character of Rodanow, and the standing of "The Rodanow Watch Company." Investigations made by the detectives showed that Rodanow was a liberal advertiser in foreign countries, especially in Aus-

tralia and the East Indies, where he also distributed circulars liberally. One of these circulars reads as follows:

The Rodanow Manufacturing Company, (limited) capital \$2,000,000, Boston, America, will forward hereafter even one single watch to any part of the world, at wholesale price, *i. e.*, 35 per cent. cheaper than any watchmaker, as none of them is manufacturing watches himself, but only buying them from here. We call the particular attention of everyone intending to purchase a first class, reliable watch to our following price list:

(Here follows a list of prices quoted in English currency.) Persons residing in any part of the world need not hesitate to forward their orders to this establishment, they may rely upon receiving the exact watch as ordered by them, which, if not approved, will be exchanged free and safe by post or money refunded. The best means of sending money is by draft on New York, Paris or London, which can be procured at any bank and everywhere, or enclose the amount in bank notes, gold coins or postage stamps of any country in the world. All orders, the smallest as well as the most important, will receive the same particular attention and will be forwarded without delay. We respectfully ask for a trial order.

The Rodanow Manufacturing Company, 5 and 7 Portland street, Boston, United States of America.

At the place designated is a stove store, in a dingy office in the rear of which, Rodanow was found. He was uncommunicative regarding his business, so the detectives sent him a decoy letter, registered, containing money, and desiring a watch to be sent to the writer's address. Rodanow received and receipted for the letter, and in response sent a watch that he bought of a neighboring dealer for \$3.78, which was 75 cents more than he received from his customer. The arrest of Rodanow followed, and he was charged with using the mails for illegal purposes. He was committed to jail in default of \$1,000 bail. At the same time that Rodanow was arrested, Dr. Edward Nathan-Ganz, a communist agitator and publisher of the *Anarchist* and other revolutionary papers, disappeared, sending a note to his office saying he was suddenly called to New York. As the doctor is an erratic sort of a person, his friends were alarmed and were consulting as to the best means of finding lost persons, when the doctor suddenly appeared, and laughed at their discomfiture. Next day he disappeared again, leaving word that he had gone to Chicago. Finally, a note addressed to a friend led to the discovery that Dr. Nathan-Ganz and Rodanow were one and the same person and that that particular person was in jail. As Dr. Nathan-Ganz, this individual accounted for his incarceration by claiming that there was a person named Rodanow, who is a cousin of his; that he was at his office when the officers called to arrest him, and, knowing their errand, he whispered to Rodanow to escape, which he did, while he impersonated his cousin, claimed to be the veritable Rodanow, and suffered himself to be arrested. He was impelled, he said, to this magnanimous act because Rodanow has a wife and some children. Now, whether this incarcerated individual is Rodanow or Nathan-Ganz, or whether he is both, or whether there is still another Rodanow, who is the alleged proprietor of a watch company (limited), or whether Ganz is Rodanow or Rodaganz is Ganzanow, or whether each is either or both are one, are conundrums the authorities were perspiring over at last accounts. It is also puzzling to the friends of Dr. Nathan-Ganz how he could be running revolutionary newspapers, associating with Nihilists, communists, and all sorts of Guy Fawkeses, and at the same time run a bogus watch mill which they never suspected. Yet the evidence is positive that he received and receipted for the Rodanow letters, that he bought and sent the watch in response to the decoy letter. In fact, it is all a muddle. We are inclined to think the individual is neither Rodanow nor Nathan Ganz, but the great philanthropist, Aristarchus Plumbago, whose eccentricities we recently described. We await the issue of this case with anxiety. All that appears to be definitely known at present is that a man calling himself Rodanow, claiming to run a watch factory that has no existence, has been receiving numerous valuable letters from foreign countries in response to deceptive advertisements. The presumption is that he is a swindler, an imputation which Rodanow-Nathan-Ganz, the prisoner, repels with scorn.

The Jewelers' League.

We devote this column to the interests of the League and its membership. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will be herein answered. Address *Jewelers' League, Box 4001, P. O. New York*, or the office of THE CIRCULAR.

The new Executive Committee of the League met on Friday, Feb. 4th, and organized by unanimously electing James P. Snow Chairman. The position was tendered to R. A. Johnson, who had performed the duties of the position so well during the past year, but this gentleman declined to accept.

There were fifty-seven applications for membership presented, of which seven were laid over for corrections and investigation, and the following fifty were accepted:

William Ellinger, Franklin Hebbard, Moses Ettinger, R. J. Herbert, Henry Fera, Wm. J. Carrow, Joseph Hamerslag, Louis A. Cuppia, H. W. Downing, John A. Hudson, George Hutchinson, Ralph M. Hyde, Peter Koch, Alexander Latner, Fred. L. Martin, Adolphus Marx, Nestor Marx, Chas. F. Moelich, Alpheus W. Page, Adolph Schwob, Horace D. Sherrill, Simon Sichel and George W. Wood, all of New York City.

Joseph E. Haggerty, Chas. J. Meyer, Wm. G. Stack, James F. Kelly and Wm. F. Shiebler, of Brooklyn; Philip Berger, Rochester, N. Y.; Frank A. Garrett, Syracuse, N. Y.; Theo. W. Burger, Plainfield, N. J.; Ludwig Hess, Elizabeth, N. J.; Wm. H. Hurlbert, Bayonne, N. J.; Samuel R. Jacques, Trenton, N. J.; Nathaniel H. White, Newark, N. J.; Nicholas A. Anker, Jersey City, N. J.; T. G. Frothingham, North Attleboro, Mass.; James A. Taylor, Middletown, Conn.; Chas. E. Graves, John B. Wiggins, Ganson B. Holton, and J. A. Ballentine, of Chicago, Ill.; George D. Parsons, Springfield, Ill.; E. R. Williams, St. Joseph, Mo.; Theo. Bungens, St. Louis, Mo.; Wm. R. Jackson, Franklin, Ky.; Samuel Kramer, Raleigh, North Carolina; Thomas W. Blake, Raleigh, North Carolina; Theo. J. Crane, Lake City, Minn.; Chas. F. Veit, London, England.

Total membership up to date 1,098.

The following communication which was received by the Committee speaks for itself:

New York, Jan. 25, 1881.

MR. WM. L. SEXTON, Treasurer Jewelers' League:

DEAR SIR—Herewith please find twenty-five dollars, the first gift toward the "permanent fund" of the Jewelers' League, as provided for by the recent amendments to our constitution and by-laws.

I hope that this little sum may be the nucleus of a fund, the income from which may, for many future years, assist in providing for the widows and orphans of our fellow tradesmen.

Very respectfully,

Membership No. 1.

GILBERT T. WOOLM.

Another member of the Executive Committee supplemented this donation with enough more to enable the purchase of a \$50-4 per cent. Government Bond. Now it is in order for others to "go and do likewise."

It is understood that Messrs. Kimball and Shiebler, who have been appointed a special committee on printing for this year, will soon have the annual reports ready for distribution. A copy will be sent to every member of the League, and will be valuable, because in addition to the proceedings of the annual meeting and the full list of membership up to Jan. 18, 1881, it will contain the amended constitution and by-laws.

Address to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH.

AFTER your shop is fitted up as described in my last communication, comes the waiting for customers. And during this interval I will speak of the manner of working up a business. There are several conditions, or perhaps it would be better to say, several points to be considered before we can properly select the exact course to be pursued. The first is, where is our imaginary shop located? Is it in a large city, a medium-sized city, or a small town? It is important to know at least if it is a large city, because if such is the case, a different course must be pursued than if a country town. We will in the

first place assume that it is a large city; and that you have profited by the suggestions given in former articles, in regard to making friends and having as many people as possible know you, and know of your intentions of starting a place for yourself, and finally that you have started such a business. The best advertisement you can possibly have is to thoroughly know your trade; the next best is to get everybody to believe it. The first is entirely in your own hands, for you can be about as good a workman as you are a mind to be, as energy, with patience and practice will do wonders in this respect. The second clause, or how to let outsiders know it, is not so difficult as you might at first imagine. Most people think four out of five watchmakers are quacks; consequently all you have to do to establish yourself solid on the basis that you are the exception. And above all things if you get a job, (I mean if you take it to do), don't let it go out of your hands until you are perfectly satisfied, even if you don't get one-fourth of what it was actually worth to fix it. Such a course will keep all the customers you have, and these same friends will help you to other customers, as there is a strong feeling in most people to help a young man—a beginner. In regard to advertising in a large city, the daily papers, for you, are almost worthless—it would be putting your small place in side by side with a stock worth a couple of hundred thousand dollars. No, what you want to have understood is that your customer can be as well (or better) served by dealing with you than by going to some place more expensive. If you advertise at all in daily papers, let it run something like this:

"Notice.—If you have an old style English or Swiss watch which you have been told is worn out and not worth spending any money on, bring it to me, as I make a specialty of such work. No charge for an examination and estimate. J. S. S., No. — M. Street." Advertisements in the shape of little bills as large as one's hand, headed like this: "If you have a watch please read this at your leisure." Then set forth what you wish to have known; but be as brief as possible. Such notices will undoubtedly be lost at the rate of ninety-nine to the hundred, still this ratio will pay. There is something about this little bill distribution I would have you remember—let the distribution take place at such hours as the people of your neighborhood are passing; morning when mechanics and shop girls are going to work—afternoon, when ladies are out shopping—evening, when people are going home from work; but from 8 A. M. until 2 P. M., do not distribute. Let the person to hand the circulars out be a well-dressed and pleasant appearing little boy of 10 or 12 years of age. So much for advertising. Now we will see what can be done to make your place attractive. In arranging your show window, let enough of your goods be displayed to show what you have, and to give an idea of your stock; but all the time you are dressing your window keep the idea in view that you are arranging it for two purposes—first, so that people will stop and look, and after they have looked, they will be induced to come in. It is not to be supposed that with your small stock that any new combination can be made which will override your wealthier competitors; but you can by your ingenuity produce a novelty which will more than compensate the difference. Devise some new and original automatic toy, using an old Yankee clock movement for the wheel work, adding the parts necessary to carry out your idea. Perhaps someone will say, "what is I get up that new, every idea of this kind has been worked out." To such I would say, that much nicer and more ingenious things of this kind lie hidden in the future than ever has been yet made. One suggests itself to me as I write—nothing in any way remarkable, but still it would answer as a window novelty for a while. Figure of a juggler seated facing the street, with a table in front of him. Automatic motion of the head varied to suit the taste; cup (in one hand) resting on the table—raises the cup, and finger ring is seen—cup goes down, head turns, bows; cup raised again; gent's stud in place of ring; cup down, juggler's left hand raised mysteriously; in raised again, gent's cuff button; juggler nods knowingly; cup raised, nothing visible; and so along until say, fifty different articles are shown under the cup. The motions of the head need not be so very complicated, say we will have these repeat after the motions mentioned above. The mechanism of the display under the cup could be quite simple; select such articles as would not exceed one inch in diameter, and the number you wish to display; we will suppose this number to be sixty. Now, if each is shown for half a minute, or rather if it takes a half minute from one exposure to another, it will be just half an hour before the same article will be seen twice. Make wheel twenty inches in diameter of light wood; small, thin pieces are the best, such can be cut from old cigar boxes will do splendidly. Commence by taking a piece of cigar box (or any thin soft wood) eleven inches long and half an inch wide. Make two holes exactly ten inches apart; this is for dividers, or bar compasses to sweep your circles.

(To be continued.)

"Diamond Cut Diamond."

A WRITER in the Boston *Herald* describes in detail the process of cutting precious stones. There is as little known, probably, about the work of the lapidary as there is concerning the labor of any other skilled artisan. This is not to be wondered at, however, since the number engaged in the business is very small, while the trade is pursued in a very quiet and unostentatious way. But the work of the lapidary is by no means insignificant. He is not to be ranked among laborers who daily pursue their toil without being required to exercise the power of their skill and senses. On the contrary, the work of cutting and polishing ornamental stones requires a skilled hand, a practised eye and the exercise of good sense, taste and judgment. It is true that usually steam power lightens the labor of the lapidary; but, on the same principle that a grindstone revolved by steam will not put a keen edge upon a knife without a practised hand to guide it, the lapidary's mills would be practically useless if the lapidary were not skilled and practised in his profession. The lapidary's work is the cutting and polishing of all ornamental stones, with the exception of diamonds. Diamond cutting is a trade or art by itself. "Diamond cut diamond" is a saying as old as the hills, and nearly everybody knows, however small their knowledge of the work of the lapidary may be, that diamonds are cut with diamonds, and that nothing else will make the least indentation upon the surface of the most precious of gems. Other precious stones and gems are cut and polished in an entirely different manner; in fact, there is no similarity between the work of the lapidary and the work of the diamond cutter. While diamonds are the most precious and highly prized of gems, it may safely be assumed that there are more stones of less value worn as ornaments. So the questions naturally arise: Why are there so few lapidaries in this country? Why is so little commonly known of their trade? Even in the city of Boston, which boasts of 350,000 people, there is only one master lapidary, and in the great metropolis of New York there are probably not over half a dozen, while the number in the whole country may safely be estimated at less than a score. And yet millions of stones, both precious and comparatively valueless, are sold yearly, and, at some time or another, they must have been cut and polished. Most of this work, it may be stated without further preface, is done in Europe. In some sections of the old country, more notably in Germany, the work is extensively pursued. There are large establishments, employing many hands, most of whom receive niggardly wages. The work is turned out at comparatively small cost, and the products of the establishments flood the American markets. It would be useless for an American lapidary to attempt to compete with his foreign brother, except in a small way, and it is not known that so rash an experiment has been attempted. If you lose an onyx, an amethyst, a bloodstone or any gem from a ring, breastpin or other article of jewelry, you take it to the jeweler, and, usually, you will find that he has a large stock of stones on hand, and the chances being that one will be found that will fit the article. If one is not found, then you will select the kind of stone you desire, and the jeweler will call the services of the lapidary into use in fitting it. If you should take a trip to the Rocky Mountains, Colorado, or some other section of the west, and, while there, should find a chalcedony, or some other stone common to those regions, and desired to have it cut into an ornament for a ring or breastpin, then, again, the services of the lapidary would prove invaluable. It was stated above that the American lapidary did not attempt to compete with his foreign brother; but the amount rather than the quality of the work was referred to. Indeed, as good work in this line is done in this country as is done abroad, but the American lapidary is more of a jobber—that is, he does not cut and polish stones in large quantities to be kept in stock. He purchases the rough stones, if they are not valueless, receives the same from the jeweler, and cuts and polishes them according to orders, and he fits stones that have been cut to the form and shape desired. The work of the lapidary is simple, and yet it is complicated. It seems simple enough

when the operations are watched, but if a novice were to "bear a hand" in the work, he would discover how much precision, skill and patience the work requires. Some of the most valuable of precious stones when in their rough and natural state are anything but attractive objects; hence the work of cutting and polishing is surpassingly pleasing and interesting, although there is nothing especially attractive about the workroom of a lapidary. If the stone to be cut is a large one, the first work is to saw out a slab approximately of the size desired. This is done with a circular saw about ten inches in diameter, made of hammered or planished iron, which runs horizontally, and is known as a slicer or slitting wheel. The outer edge of this saw is not jagged; on the contrary, it is like the blade of a knife ordinarily sharp, but it is necessary to frequently charge it with diamond dust to give the metal sufficient hardness for cutting. The cutting is done by holding the stone against the edge of the saw, the practiced and experienced eye guiding it with wonderful exactness. The next operation is to cement the slab of the size desired on the end of a stick, which is from three to five inches long and sharpened at one end. The cement used is manufactured by the lapidary, and is composed of Spanish brown, beeswax and resin. The next thing is to bring the stone down to the shape and size desired.

The operation is called "sizing," and it is done on a revolving lead wheel, about ten inches in diameter. As the wheel revolves it is charged with coarse, pulverized emery, put on with a brush, and, as the stone is cemented with stick or handle, it can easily be held against the revolving wheel, although it is nice work to turn it out in just the shape and size desired. Then comes the most delicate of all operations—that is, the cutting of the facets or squares. Very few stones in rings, bracelets, or other articles of jewelry, are simply flat or square, and the greater the number of edges and angles the greater the cost. This work is also done on a lead wheel, which is charged with fine, instead of coarse, emery as in the work of sizing. Close to this wheel, set in the table, is an upright peg or socket of wood, which is perforated with a number of holes, and which serves to retain, at any desired angle, the stick upon the end of which is cemented the stone to be ground in facets. In this way any angle desired can be obtained, and at first sight the peg or socket seems to act as a guide, but on the contrary it simply acts as a rest for one end of the stick, the guiding being done entirely by the eye. The work requires long practice, and a workman competent to undertake the less important operations might not be able to do this work to perfection. The face of the stone is cut first, and then the back. The final operation is the polishing, which is done on a revolving tin wheel of the same diameter as the others, and charged with tripoli, which is similar to rotten stone. To make the powder adhere, the face of the tin is hacked in lines with the edge of a knife, and the stone is held in position in the same manner as in the operation last described. Soft stones, or any stones with a rounding surface, are polished on a felt wheel with putty powder, after being first partially polished on a wooden wheel with pulverized pumice stone. In the polishing operation the wheel is usually turned by hand by means of a crank, but steam is the motive power of the other wheels and the slitting saw. The wheels are termed mills, and are designated as the cutting, sizing, polishing mill, etc. The various disks or wheels are adjusted to a vertical spindle, and one of them is set in the table or lapidary's bench, so as to revolve horizontally just above the surface. Its axis extends beneath the table, and is there connected by a belt with a driving wheel attached to another vertical axis, which also passes through the table. Then the mills are fed with moistened diamond powder and emery and water, the hard powder embeds itself in the soft metal, and this becomes merely the medium for holding the abrading material, and the softer substances apparently grind and cut the harder objects that are applied to it. Diamond powder for the mills is prepared by grinding the waste particles in steel mortars till they lose their sparkling appearance, and it is applied mixed with olive or sperm oil.

At the works of Aberstien on the Nahe, in Germany, grindstones are used in shaping and sizing gems, the stones, which are of large size, being run by water power. The workers become exceedingly dexterous in prosecuting the work, and lie down in front of the grindstones, the body being supported by a sort of stool. The sapphire and ruby are considered the hardest stones to cut, and the cost of cutting and polishing is always depended upon by the number of facets desired, and many considerations, too numerous to mention. It is well known that nowadays there are a great many artificial imitations of gems, and these modern imitations are so perfect that the tests of

comparative hardness and of specific gravity are often required to determine them. The chemical tests which are usually employed to distinguish minerals cannot be applied to these stones on account of the injury they would occasion. In Attleboro, Mass., and Providence, R. I., a great many artificial stones are turned out. At one time a great establishment in Paris, which gave employment to 100 workmen, beside many women and girls, was the most famous manufactory in the world of artificial gems. The sand used to furnish the silica is from the forest of Fontainebleau, and its quality is so highly esteemed that much is exported for similar use elsewhere. The gems are thus only imitations that they can be distinguished from genuine stones only by the closest scrutiny of those experienced in such matters.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Eighty-second Discussion.—Communicated by the Secretary.

[Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Houghton, Esq. Write only on one side of the paper, state the points briefly, mail as early as possible, as it must be received here not later than the eighth day of the month in order to be discussed and reported in the CIRCULAR for the next month.]

CLEANING WATCH BRUSHES AND WATCH MOVEMENTS.

Secretary of Horological Club:

Will some member of your honorable body inform me of a good way to clean a watch brush? I have tried several ways and none are satisfactory to me. And also of the best fluid for cleaning a watch movement, whether benzine, ether, or what. In a back number of the CIRCULAR I saw an article of Caleb Cook's on Watch Oil. I think Mr. Cook is wrong about no one but himself knowing how to extract oil fit for watch use from the fish, as Ezra Kelley's Chronometer Oil stood the test of a watch being lost and lying overnight in the snow with mercury down to twelve below zero, and had only been cleaned by myself two weeks before. It gained one-half hour during the night.

P. C. T.

Mr. Horologer thought the best way to clean brushes was to take a basin of warm water, pour into it enough *aqua ammonia* to give it a strong smell and make the water feel slippery to the fingers when rubbed together, then dip the bristles in the water, rub over a cake of good soap, rub two brushes together, making plenty of lather, and the combined effect of the soap, ammonia and rubbing will scour the brushes as clean as new. The backs of the brushes should not be dipped in the ammonia water, but the bristles should be plentifully "soused." When clean, rinse with warm water and set up on end in a warm, airy place to dry. Do not use them again till thoroughly dry. In order to prevent the bristles becoming loosened by the wet, and coming out, it is a good idea to flow a thin solution of shellac into the holes and cement the bristles in firmly, at the same time stopping up the holes. Care must be taken that the shellac is not put on so freely as to run up along the bristles, as that would ruin the brush.

Many workmen consider soap and water with ammonia as the best way of cleaning watch movements, cases, jewelry, etc. So that the preceding operation could be utilized for cleaning both the brushes and the movements. But very little ammonia must be used, when cleaning movements, or thinly plated goods of any kind, as the ammonia will soon dissolve off both gold and silver. For watch parts which are thinly gilt, the best fluid is either soap and water alone, or strongest alcohol. But alcohol must not be allowed to touch pieces that are cemented together, such as levers, pallets, roller tables, and the like, as it would dissolve the shellac or other cement and loosen the jewels. It is ignorance of this fact that causes rub pins, pallet jewels, end stones and other similar parts to come loose after some workmen clean watches. Instead of being paid for replacing them, they ought to be prosecuted for damaging the watches. Pieces which are cemented together should be cleaned by soaking in pure benzine. As the pure article for our use is seldom kept at the drug stores, it should be purchased from some reliable material dealer, who knows what is required, and who will furnish the right article if he furnishes anything.

REPLACING LEAVES IN CENTER PINIONS.

Secretary of Horological Club:

Will some of your honorable body please inform me through the JEWELERS' CIRCULAR, how to replace broken leaves in the center pinion of a Swiss watch? Please give full directions and oblige.

APPRENTICE.

Mr. McFuzee replied that his advice would be not to do it at all, for it was a sort of patching that could hardly escape the name of botch work, no matter how well it was done. In his youthful days, when new center pinions were hard to get and quite expensive, the custom was to make new pinions when wanted. As that was considerable of a chore, it was thought excusable to mend a broken one, when it was not too badly off, and belonged in a cheap watch. This was done by turning a small brass collet to fit closely upon the pinion and cover the ends of the leaves. The broken leaves were then accurately set in their places, and secured by riveting the upper ends by driving the metal of the wheel around them and driving the collet on so as to slightly embed the lower ends of the leaves in it, at the same time making it fast on the pinion. The very slightest bit of soft solder was then flowed around both the top and bottom ends of the broken leaves, but not allowed to fill up between them. Finally the soldering fluid was thoroughly removed by boiling in water, without soap or grease, which would combine with the chloride of zinc and form a sticky compound difficult to remove. But nowadays, when pinions are so cheap, and every workman has a good lathe, it is but little more trouble to fit in a new pinion, for which you get a better price, and your neighbor, over the way, cannot show your patched job to people as a proof that you are nothing but a "soft solder botch" of a workman. By all means fit a new pinion, and do not try to patch the center or any other pinion.

QUICK TRAIN MOVEMENTS.

Secretary of Horological Club:

Will some of your honorable body please tell me through the JEWELERS' CIRCULAR why a quick train movement will keep better time than a slower one of the same grade? Resp'y yours,

YOUNG WATCHMAKER.

Mr. Ruby Pin said that he presumed that our correspondent did not want a theoretical disquisition, but practical reasons; and the principal ones were these: A quick train movement is more "detached," i. e., the length of the time that the balance is in connection with the train, during each beat, is shorter, and the balance is "free" a larger share of the time. Again, the balance is generally lighter, or, if of the same weight as a slow train balance, it is smaller, giving it a more vigorous, lively, self-sustaining motion. In quick train movements, the hairspring is generally stronger, comparatively, and has a greater control over the balance. All these points make the balance less liable to be affected by the outside jays, shakes, and twistings to which it is subjected while in use. It will not be necessary to explain why it is so, as our correspondent will doubtless see at once that it would be so.

DRILLING AMERICAN LEVER STAFFS WITHOUT DRAWING THE TEMPER.

Secretary of Horological Club:

I noticed in the CIRCULAR of last month, a question from an apprentice about drilling balance staffs without drawing the temper. Now I think just as Mr. Uhrmacher does about the matter; it is just as unnecessary to drill or try to drill a staff without drawing the temper, as it would be to take the case out of the movement and wind it up. But there are two things I would like to call Apprentice's mind to, which I think Mr. Uhrmacher had forgotten in his answer, and that is, first, to drive the staff out of the balance, if it be anything but a plain one; second, to select good steel for the new pivot and give it the same temper as for new staffs and pinions. Now the best way I have ever found to draw the temper from a staff or pinion is to take a stout piece of copper wire and bend it in the form of the letter U, let it be about an inch long, and have the two ends come together. When you have your staff ready to heat, open the ends of the clamp far enough to take in the end of the staff, and the spring of the wire will keep it there. Hold the opposite end of the clamp in the lamp, and you can see when the color begins to come; take it out of the flame and lay it aside, without removing the staff from the clamp until it is cool enough to handle. I always stick a piece of wet pitch

on the opposite pivot, and then, if the heat should be a little too great there will be no danger of drawing the temper from the other pivot. Now, if I have said too much about the matter, I hope Mr. Uhrmacher will pardon me, for he knows that an apprentice wants all the details he can get that pertain to the workbench, if he has any hope of success in his business.

W. S. H.

Mr. Uhrmacher said that no apology was necessary, as we are always glad to hear from any of our readers who can add to or improve upon the advice given in the Club, or who have different opinions on any point. The advice given by Mr. H. is good, and he (the speaker) had not forgotten it, but had omitted it, as it was not strictly called for by "Apprentice's" question. He could say that his own way of holding the staff, when there was any danger of softening the other end, was to hold that end of the staff in a pair of cold plyers, lined with brass or iron to prevent marring the article, then draw the temper from the other end by heating the copper clamp, as Mr. H. describes. He also used a similar clamp for cementing in ruby pins, and similar work, to heat the articles without bringing them near the flame. When all was right, the clamp was easily pulled off, leaving the article to cool.

CLEANING WATCH CASES.

Secretary of Horological Club:

After taking out the movement, examine the case carefully, and ascertain if the hinges are straight, and the bow tight in the pendant. If not, remove them and straighten the pins, and close the bow until it moves close. See that the push pin fits snugly in the pendant, to prevent dust and dirt from entering; also see that the top and back fits, if either of them have become sprung from any cause. They can in most instances be adjusted by placing the thumb of the left hand inside the case, and with the right spring it back, or use a case stake with buff mallet. Then shut the case, and with a boxwood mallet tap the edges of the back or top, as the case may be. This will fix your case ready for cleaning. Now remove the cap (the better to get at the inside of the back case) and bezel, and, with a camel hair pencil, apply spirits of ammonia to the outside and inside of the case, which will loosen all the dirt and grease. Use a stiff brush, with chalk, brushing briskly until dry, when it will be clean and ready to polish. I suppose of course that every watchmaker has a polishing lathe, at least should have one. No shop, however small, should be without one, and they are so cheap (a good one can be obtained of any material dealer for \$12, with brushes, buffs, rouge, tripoli, &c., complete), that they are within the reach of every good workman. First, polish the inside of the case with fine jeweler's rouge, then the outside. Then wash the case in strong soapuds, and rinse in pure rain water, and dry in sawdust. With a fine brush, remove any sawdust that may adhere to the case, and you have to all appearance, a new watch case.

Many may think that the above is too much trouble with the case, but it can be done in less time than it takes to write it, and anyone will find that it will pay. Treat all jewelry coming into your hands for repair in the same manner, and it will be one of the best advertisements of your ability to repair that could be produced, and one will find very few customers that will not willingly pay for the extra labor. It will at least give yourself satisfaction, and when a watchmaker is fully satisfied with his own work, it is a pretty good guarantee that he will please his customers.

E. E. B.

Mr. O'Lever agreed with our correspondent that it was good policy to clean and polish the case neatly. Many judge of the quality of the entire job by the looks of the case—and think, if the case looks dull and dark, that their watch has not been very well repaired. Even with those who know that the movement is the proper thing to judge by, a nicely polished case gives a very pleasing impression, and disposes them to be better satisfied with the performance of the watch.

He would add one point, about which many watchmakers were careless. They should not only clean the cases nicely, but keep them so, and not allow them to get dirty and black while hanging in the case. If their hands are sweaty, they should either use gloves or a chamois skin to handle the watches while winding and setting, and whenever there is the least necessity for it, the cases should be polished up again with chamois and rouge. A watch rack filled with bright, shining watches is a prepossessing sight, but nothing will disgust an intending customer more quickly than a rack of smutty, dingy, black cases, such as we see too often, even in shops that make pretensions to doing fine work.

PRACTICAL HINTS ON WATCH REPAIRING—GRADING DIAMOND DUST.

Secretary of Horological Club:

Will you please send me another copy of Excelsior's work on Practical Hints on Watch Repairing. Find enclosed P. O. Order for \$3.50 to pay for same. I had studied the copy I got of you so long and thoroughly that I thought I could get along without it, and was foolish enough to sell it to a fellow workman in another shop. But I find I want it every day. No workman can get along without it after he knows what it is. I hate to trouble you again, but don't know where else to send for it. Why is it not advertised in the CIRCULAR? I am sure a great many would buy it if they knew about it. Will you please tell me of some oil to grade diamond dust with, that I can keep it in? Olive oil spoils in a little while. Respectfully, P. T.

The Secretary replied that he had forwarded the book as requested. Mr. T. would find that it *was* advertised, by looking over the advertising columns of the CIRCULAR. It was not called "Practical Hints on Watch Repairing," however, but a "A Practical Treatise on the Balance Spring, together with the Adjustments for Heat and Cold, Positions, Isochronism, Rate, etc." This difference of name was probably what mystified many, and led them to think it was a different work. It seemed to him that the adoption of that name was a mistake. Every intelligent watchmaker in the land had read or heard of "Practical Hints," and desired to possess them—but very few of them might be aware that this "Practical Treatise" was really the first series of "Practical Hints." So that there were probably a great many who wanted the latter, but did not know where to get it. He would say, however, that it was no trouble to him to procure it for any of our readers who desired it—and, even if it was, he would willingly take that trouble for the sake of circulating it among the trade. It was his opinion, as well as that of the entire Club, and all good workmen whom he had heard speak of it, that it contained more solid, reliable information on those subjects for the practical watchmaker than any other work he could get, and in no other way could the workman invest better, the amount which the book cost—not even for tools. For this would tell him not only how to work, and use his tools, but how to make tools he could not buy. Let all who wished send in their orders, and he would willingly fill them, or see that the books were promptly sent to them. As for the oil for grading diamond dust, Excelsior recommended sperm oil as not liable to become rancid, and well adapted for keeping diamond dust in, ready for use. Of course the dishes must be carefully kept covered, to prevent atmospheric dust and dirt mixing in, which would injure its efficiency as a graded abrasive.

[Note.—The Secretary would state, for the benefit of our readers, that the breach between the Club and the Chairman had been happily healed, to the satisfaction of all parties—the members having given assurances that hereafter they will hold themselves in readiness to sacrifice even their lives, if need be, in the sacred cause of science. But they fervently hope that there are no more patent safety balances in existence.]

A CONUNDRUM.

Secretary of Horological Club:

Will sugar eat through silver or plated ware? If so, in what length of time? J. P. S.

Mr. Electro said that he never heard of sugar acting any such conduct like those. Sugar of lead might do it, and he had known sugar coated pills that were remarkably energetic, and had every confidence in their ability to work their way through plated ware or even a modern ironclad man-of-war. Sugar, when compounded with Jersey tangle-foot, is said, by those who have tried it, to be equal to eating its way through a cast iron stomach; it might be injurious, also, to silverware. But the plain, unadorned sugar of commerce was not generally suspected of eating anything—on the contrary, it was more generally eaten. Still, if it is suspected of any such dangerous proclivities, he would advise him to cork some up in a silver sugar bowl—or a plated one will do—and carefully observe its operations for three or four hundred years. If it eats its way out, send a sample to the Club.

How to Regulate Watches.

MANY article, says Herman Grosch, have been written on regulating watches, and M. C. Saunier, in his great work on horology, has pretty exhaustively treated the subject. I presume it will do no harm to write a chapter or two on the same topic, and give my experience of a series of years. I must confess that this matter has often appeared to me as neglected; able regulators were scarce years ago—there were a few at Geneva, who made a great secret-mongery of their art, and taught no pupils; it was not much better in Paris; London had some eminent regulators also, although to judge by the expressions of Mr. Glasgow, the contrary was the fact. It gives me great pleasure, however, to speak of the results of Mr. Lange, in Glashütte; his anchor watches stand unrivalled—a difference of two seconds in four weeks, as is shown by the certificate of the astronomical observatory of Leipzig, is certainly a worthy achievement in that direction, especially when taking into account the severe tests to which a watch is exposed in these places.

In what does the actual value of a watch consist in the eyes of its owner? Clearly, solely in its exact rate. By being well regulated, I understand, not alone being regulated for the different positions, but also for all changes of temperature. Present anybody with a fine watch which does not go well, and he will call it bad. The treatment this little piece of mechanism receives at times, contributes to ruin it altogether.

An isochronism, or the even duration of time of the greater and smaller vibrations of the balance wheel, is only attained under the following conditions: 1. The center of gravity of the balance spring must be located upon the axis of the balance wheel. 2. The several coils of the balance spring must also during, that is, during the vibrations of the balance, remain concentric to the center of the balance. 3. The pivots must, during the uncoiling of the balance spring, exert no pressure or friction upon the sides of their holes.

These conditions may best be had by a cylindrical, next by a Breguet (curved), and lastly, under certain conditions, by a flat spring. We will occupy ourselves chiefly with the Breguet spring. The writer would call attention to the very excellent prize essay of Mr. Immisch, "The Isochronism of the Spiral Spring." The man is visible everywhere who has by deep study, a practice of many years, and experience, penetrated into the mysteries of isochronism. Every regulator recognizes his worth, and he is entirely correct when saying that the balance spring does not alone produce isochronism; nor is it dependent solely upon the length of the spring.

I am constrained to say that I do not in everything coincide with him; I cannot conscientiously support his idea of flattening, or even shaping obliquely the pivot ends; regulating in hanging and lying is nothing else than the equalizing of the smaller and larger vibrations of these positions. Increased difficulties have to be overcome when regulating a watch for a vertical position; its vibrations will be smaller and of shorter duration, owing to the increased amount of pivot friction; while horizontal, in which position the friction of its pivots is lessened, the vibrations will be found longer, but of shorter duration. This is the most important and at the same time most difficult part in regulating; it is necessary to contract the friction as much as possible, which is also increased by the thickening of the oil, and slightly rounded balance pivots, well polished, with corners rounded off, appear best to me. A good shape is the conical, but that part entering into the jewel hole should be perfectly cylindrical; its end must run against the cap jewel, neither be too thick, nor so weak that a fracture might be feared at every jolt; the jewel holes should be olive-shaped, well polished, the pivots fit well and at the same time have enough play so that the balance may swing as unconstrained as possible.

As I write especially for beginners, I would recommend them to examine if there be any error in the movement which would destroy entirely or render difficult a true regulation; let all the parts of the watch be in perfect order, a simple, small defect may upset your endeavors. One fault, which exists generally only in fine works, is that

the parts of the movement stand in too great a degree of exactness to each other. The escape is sometimes unequal or contracted, and in many cases it is sufficient to merely remove the gilding from the plate where the fork banks when at repose, to correct the error. To be certain, take each single tooth of the wheel, while holding the fork with a sharp-pointed cleaning stick, and pass it to both sides of the repose.

Satisfy yourself that all jewel holes are straight, and that no cramping or squeezing takes place. Look well to the depthing of the spring barrel, stop-work, and the development of the spring. Consider that each want of attention, each carelessness revenges itself bitterly; much time is wasted in fruitless endeavors, and you regress instead of progress; it is true, also, that there are many rebellious watches, always inclined to backsliding. Satisfy yourself that the balance wheel pivots are round; in supposed conical pivots I have often found them oval; it is difficult to discover this error, which produces the same effects as a balance not counterpoised—an absolute isochronism cannot be obtained; no remedy remains but to make a new arbor, which must, of course, be well handeled.

There are errors at times which betray themselves to the ear rather than to the touch or sight; wind the watch for this purpose, set it in motion and listen, while holding it in all positions. A slight rubbing of the ruby pin against the bottom of the fork, or on the guard, or on the horns of the fork, a scraping of the balance spring, its uneven development and other errors belong to this class.

The balance, more than any other part, demands our full attention; it must stand entirely vertical and must run round and be perfectly evenly balanced. It will have occurred to many a watchmaker that a watch was regulated exactly, and whose balance was perfectly true and round, has been returned to him after some time because of its inexact rate, and could not be regulated, although not the least disturbance was visible. A close inspection showed that the balance had lost its truly round condition, and regulating was out of the question. The seat of this complaint may lie in the unequal homogeneity of the balance metal. To prevent a recurrence, heat it on a flat metal plate to about 80°, let it cool and carefully round it between the fingers; then heat it again, and continue until no more warpings take place, and you are satisfied that it will retain its true round form.

If you are forced, on hot summer days, to handle a balance often, when, let us say, turning in a new arbor, &c., it is well to lay it at times on a cold metal plate to cool it off; without this precaution it may happen that the rim will contract, thus changing in mean or low temperature its diameter, and its regularity is disturbed. The size of the barrel cover has been accepted as the governing diameter of the balance, and half the width of the spring as height of the rim or ring. This is provided with from 12 to 16 gold screws. A proof of the compensation can only be had after the isochronism is perfected, and when the watch is regulated in the different positions; because if were to become necessary to increase or decrease the number of screws, there is no doubt that the equipoise would be disturbed by so doing.

If a watch gains in heat, the screws or masses upon the balance rim must be moved from the cut; if no satisfactory result is obtained by this, file off a little from the rim at the cut, and replace the wanting weight by two small screws placed opposite to each other. If it loses, however, in heat, remove the screws or masses toward the cut, and, if not enough, replace them by heavier platinum screws. By the length of the balance springs in use, this becomes very seldom necessary. A little practice will soon initiate the workman into the secrets. It is necessary to have a box of sheet iron to regulate watches for heat, which is heated from below by an alcohol flame (gas is better), containing several shelves; a thermometer is placed into this. The trials are made up to -30°, -35°, and 40° Reaumur (boiling point of water at 80°) and continued for 12 hours.

An ice closet or chest also is requisite in summer time to regulate a watch for cold, within which fits a tin box, filled with equal parts of salt and ice; this contains another box in which are placed the watches

for trial, and a thermometer. These trials must be continued for at least 12 hours. A costlier procedure is necessary to obtain a higher degree of cold—from $20^{\circ}\text{--}21^{\circ}\text{R}$. (freezing point at 0°). A lower degree may be had by a mixture of 10 parts ice, 4 parts salt, salmiac and saltpetre each 2 parts.

I presume many a one, my worthy colleagues not excepted, has had his sly jokes when he observed me placing the watch in the oven; others have imagined compensation as something very difficult to be obtained—far more difficult in imagination than in reality, because no very high amount of skill is necessary to remove it from one hole and place it into another one, and keep on doing it until each one occupies its proper place. It is undoubtedly true that care, great care is necessary; the balance must be handled delicately. By the way, there are balances called compensated (by courtesy) and are cut up, but not as much cut up as the purchaser; and no man can produce compensation and isochronism with them. In place of these unlucky imitations, the Swiss manufacturers would be better employed by inserting a common steel or brass balance, or, if they cannot stop fooling, at least not to cut them open. The grievous faults committed by Switzerland in this respect goes beyond all endurance.

We come to the balance spring. There is no doubt whatever, that with a short spring an isochronism is more difficult to be obtained than with a long one; these latter are somewhat more dangerous for watches, for by a jolt or jar they are apt to catch on the teeth of the surrounding wheels or regulator; beside, it is easier influenced by outside motion than a shorter one. A mean length of 15 coils curved (Breguet), has been demonstrated by experience to be the best, and its diameter may be equal to the radius of the balance wheel; a fine, hard-tempered spring may be made use of at this size; I here record my experience, that I have never found as hard as large ones; I suppose it must be due to an extra difficulty in the production. Choose it as wide in the blade as possible; it is better worked, and develops itself with more regularity, without pushing, than a smaller one does. The ear will tell the coil and recoil of a spring; by a good, even working it is barely heard, while a flat one, folding and unfolding with irregularity, makes a peculiar hissing, singing noise, recognized by experience, and which betokens difficulties in regulating. It may also have its seat in the inequality of the spring blade; a few coils may be stronger or weaker; wherefore inspect with care the workings of the different coils; strong or weak places may be known by their peculiar trembling motions. Not much can be done with such a spring; throw it aside and put in a new one.

An upward curved spring must, to be considered good and sufficient, be of 15 coils, the eighth of which apparently remains motionless. This will contradict the opinions of many many watchmakers who require an even unfolding of all its parts. The matter is different in balance spring of cylinder watches; all its coils must be evenly exerted throughout its length, and this does take place in the compensation of the balance of those watches. Not thus, however, by the flat, up-curved balance spring; its elasticity is called into action throughout its whole length, but the first coil, lying round the collet, makes a greater motion than the second one, this one more than the third coil, &c., up to the eighth coil, which, apparently, stands still; while the ninth again, moves, but less than the tenth, and so on up to the fifteenth, which moves more than the fourteenth. At the moment of the greatest expansion, when the balance has arrived at its outer point, the eighth coil appears to stand still, while the seventh and ninth move, the observer is led to suppose that these two have come nearer to the eighth one; this appearance is repeated at each vibration, and is a good sign that the spring is easily reached by isochronism.

When the balance spring has not yet been placed, and the end curves have to be made, I would recommend to either use a pair of strong steel tweezers, handled with wood, that they may be heated, or strong brass ones; there is less danger of damage to the spring with the latter. Bend little by little, not too much at once, and do

not overdo it; the same condition of things holds good here as it does by bent pivots; if the steel is sufficiently heated, a pivot, slightly bent, may be straightened, but if it is overdone, the result is that in nine cases out of ten it will break.

Make the fastening point far enough from the knee; instead of the short curve so often found in Swiss watches, I would recommend an easy gradual ascent into the upper coil; a forcible disturbance of the molecular connection takes place in well-hardened springs, by a violent bend, which may exert an untoward influence upon exact regulating. The part thus bent up and again brought into a parallelism with its lower part, receives a flat curve, which, when arrived at the center of the circle of the fastening point, assumes a circular line and conforms with the outer fastening in the stud and the curb pins; this coil must be placed in such a manner that the regulator may be moved to and fro without any forcible displacement or pressure upon any part of the spring. This circular bending is best done by a pair of tweezers specially made for the purpose; one of its jaws is hollow, the other shaped round and provided with wooden handles, between which the outer coil of the spring, after it has been shaped to a certain degree, is pressed and heated. The rounding of these tweezers should be somewhat smaller than is requisite for the spring, because there is always an inherent unconquerable elasticity in them. The distance of the curb pins from each other should never be more than double the thickness of the spring blade. The center of the collet must agree exactly with that of the jewel hole. The inner spring coil next to the collet, must be sufficiently far from this to prevent an entangling at the point of fastening. Such a touching, which betrays itself by a sound like the whip recoil from a crack, is followed by an acceleration of the greater vibrations.

The manner of fastening is not unimportant by any means. If it were possible to make the fastening upon the collet vertical to the center, it would be most appropriate, according to my way of thinking; this cannot be done, however, and we must follow the custom in this instance, but deviate from it somewhat, by bending the knee, not round, but at as sharp an angle as possible—which must be done by heated tweezers, at the same time imparting to the first coil the right distance. The ends of the spring should be fastened by pins of hardened steel whose sides nearest the spring are flat; they have the advantage of being easily extracted and inserted.

The regulating may begin now; set your watch in accordance with the regulator, and let it remain 12 to 24 hours in one position, let us suppose it be the vertical, and note the difference; then place the watch horizontally, compare again and note; if, as is generally the case, the watch has gained, we find ourselves face to face with the grand secret of isochronism. A regulator, who does nothing else than regulating watches, and has a large amount of balance springs on hand, will not remain long in doubt, but will take another spring, put it in, and keep the old one for another watch. Let us try, however, to accomplish the same with the one in place.

First, draw the little surplus end through the stud, to lengthen the spring, flatten the curve somewhat and lengthen it, and compare. If the trial shows that nothing has been gained by this, do the reverse, that is, insert the spring more than formerly in the stud, shorten the curve, that is, place it more to the inside. One of these proceedings will, in most cases, have the desired result; especially the change in the curved ends. If in spite of all this, the spring should prove to be very refractory, the last means is to break off a piece from the inside, and fasten anew; great care is necessary at relocating, not to leave the inner space empty, in order to make use of this remedy in regulating. Do not take off much. The position in which the two points of fastening stand to each other, is not unimportant; it will be found of advantage to let the inner one fall in the center line of the outer curve, or to locate the fastening points at a right angle to each other; fixed rules cannot be given for this, as the proportions are different for each individual watch, and other conditions must be considered; the best remedies will be found on trial. Regulating is a

difficult and time-consuming operation, and is paid at Geneva, for a first-class anchor watch, in all positions and temperatures, with 150 francs.

As far as my experience goes, isochronism is only obtained by balance springs in two different ways, always assuming that other parts are equal by changing the fastening points and flattening or rounding the curve. In one instance I succeeded in obtaining isochronism, by making the ends snake-shaped, or like an S, after having vainly endeavored to obtain a like result by changing the fastening points; it will be seen from this how changeable the circumstances can be. Do not deceive yourself, however, and try to obtain isochronism by the length of the balance spring alone; much is dependent from the relative positions of the fastening points to each other; first, to have the spring of the right tension, in order to accomplish the lesser and greater vibrations of the balance in the same time, and find the exact fastening point, to correspond with the curvature proportionate to this tension; secondly, find the exact place, where in a vertical position, in consequence of the contraction of the spring, there is the least amount of pressure, or the least amount of friction of the pivots upon the sides of the jewel holes. This point is very important; a lessened pressure frees the spring during its smaller vibrations, which cannot, with a greater one overcome this friction, and it thus becomes impossible to regulate a watch with thick and straight jewel holes. As an insult added to injury, these will often be found badly set; the class of manufacturers who do not shape the pivot holes olive-form, care still less whether they are straight or crooked.

It is not by any means a matter of indifference what motion a watch has, that is, what kind of a vibration circle the balance makes, if a good and lasting rate is desired. All parts of the watch, its escapement, &c., being in working order, and you are satisfied by the different trials to be able to obtain isochronism, it can nevertheless be recommended to insert a mainspring which causes the balance to make about $1\frac{1}{4}$ vibrations. Even common anchor watches with a flat balance spring maintain their rate with such a spring very well.

A peculiarity of the balance spring must be mentioned here—the so-called "acceleration," and which becomes apparent especially by a close regulating. The watches will maintain their rate excellently well for several weeks, and then begin to win to a noticeable degree, until they have attained in a year's time their maximum; this is due to a change of molecularity of the steel in the spring, and it will disappear only after continued going. A watch, therefore, which is regulated at this period, will preserve its rate unvaryingly. I have not learned whether this peculiarity is inherent in springs of other metals.

If isochronism could be obtained solely through the length of the balance spring, the use of a flat, instead of a curved one, would possess great advantages, partly because the construction and use of the curved one is connected with many difficulties. I have often heard it confidently expressed that a good rate could be obtained with ease by using a flat balance spring. So it can, indeed, in a common watch, and for the watchmaker who little acquainted with the manipulations it may be conscientiously recommended. But I have not yet heard a single regulator, a workman who exclusively occupies himself with the regulating of fine watches and marine chronometers (and it may be accepted as a fact that these men understand their business) express himself as preferring a flat balance spring to a curved one. It is indisputable that very good results may be obtained with flat springs; it is connected with less trouble, because no curves need be made, which process is troublesome at best, only the straight ends need be inserted, and a comparatively satisfying fastening place be found. But if an opinion is expressed from certain sources, of the superiority of the flat spring over the curved one, one does not know which most to admire, the barefacedness or inexperience of such prophets. Their arguments are founded upon the excellence of English watches, whose renown for being closely regulated is always quoted, (a praise which, I add, *adparenthesis*, is by many degrees too fulsome and highly colored), I am ready to affirm that these vaunt-

ings are either based upon national pride* or upon hearsay, not upon a practical experience.

Most assuredly, there are very fine and closely regulated watches with flat springs, of English make, but this does not prove by any means that they are better than good Swiss, French, or German ones.

To return to our balance springs and regulating. They are divided into three classes; the cylindrical, mostly used in chronometers; the curved, or Breguet, in fine duplex and anchor escapements; used in connection with compensated balances; and the flat spring, not much used for exact regulating, but chiefly in all watches of less costly construction. The cylindrical spring unites all the peculiarities with which isochronism can be obtained. The curved one, by close examination and taking advantage of its peculiarities, especially by means of a certain fastening, may be used to establish isochronism. Whether the flat spring be suitable for this purpose, is as yet a mooted question, much argued upon. While certain sides throw it aside entirely, others prove by the fine Patek's anchor watches with flat spring, the contrary. The curved spring, doubtless, yields under the hands of the skilled workman the highest results obtainable, but practice and experience of years are necessary, and clumsy hands, who only very seldom undertake such work, may forever ruin the chances for regulating. By the assistance of a well-proportioned spring, suitable in length, size and number of vibrations, to the balance, even the less skilled but intelligent watchmaker may obtain very fair results. It is impossible to note down fixed rules by which to gauge the length, breadth, size, number of coils, &c., of a spring; it depends altogether upon the quality, power, &c. of the movement; extent of vibrations, size and weight of balance, and the coils may vary from 9 to 15.

The anchor watch, which is beyond peradventure the best time-piece for every day's use, suffers under the disadvantage that the friction of its moveable parts is unduly large, and must be overcome by lubricating with oil; as soon as this begins to thicken, an alteration takes place in its rate, and it must be cleaned repeatedly. Much has been achieved, however, in the reduction of its friction, by weakening the points of its escape wheel teeth, rounding the ruby pins, &c., but in spite of all, oil and dirt will always sadly interfere with a close regulating.

To conclude with a few words about cylinder watches. Intelligent, capable watchmakers often express the opinion that they prefer a common cylinder to a common anchor watch. I think different; I prefer a common anchor to a common cylinder watch: an anchor escapement, whose separate parts are proportionately placed together, will always go easier and can be regulated closer and better than a cylinder escapement; the first is an escapement with free repose, the latter with frictional repose; these frictions change from bad to worse with time, and give rise to very vexatious disturbances. A compensation in cylinder balances cannot be thought of, and the pressure exerted by the escape wheel teeth upon the cylinder produces a continued pressing of the balance pivots against the side of the jewel holes; the vibrations of the balance, not being free, can never be as large as in anchor movements, &c. To these imperfections is due the great deviation often noticed in cylinder watches, when merely acted upon by the heat of the body; when exposed to differences of temperature an error of from four to seven minutes is sometimes noticed within 30 degrees.

I hope I have imparted some instruction to the beginner in the art of regulating, to help him in predicaments, but am ready at the same time to acknowledge that I have promulgated nothing new to the experienced and skilful regulator. I recur to the prize essay of Mr. Immisch, and recommend the student to peruse it, and finish by quoting that author: "The art of regulating cannot be learned from books; practice and experience must do their share to place the artist in the position to at the right time make use of the right means, and to obtain the best results from each watch which is possible to be had."

*Note.—I remember a resolution of the British Horological Institute, Sept. 25, 1866, accepted unanimously as follows: "The meeting is of the opinion that the special preference accorded to English watches consists in the fact that the escapement is composed of the best material, and up to the present time English watches stand unrivalled; and that these advantages be duly brought to the knowledge of the public."

Spectacles and Eye-Glasses.

BY W. J. SUTTIE.

IN my last I promised to give a few explanations of the technical terms used by opticians and oculists. Retina is the pulpy expansion of the optic nerve, in the interior of the eye; it is the seat of vision. Optician is one well acquainted with the laws of optics, not necessarily a mechanic. Oculist, one who makes the diseases of the eye a specialty. Amaurosis, a loss of sight dependent upon defective action of the nerve of vision, and independent of visible injury. It is also called gutta serena; drop serena of Milton. Ophthalmoscope is an instrument used to illuminate the eye; and a magnifying glass to enlarge the defects. Optometers are instruments for measuring the power of accommodation, and not the focus of the eye, but some ignorant vendors of spectacles use them for the latter purpose; in fact some are made for the purpose, but are entirely useless, which fact anyone can prove by looking through one and noting the index, and by repeating the process at different times, when dissimilar results will be obtained. Opsiometer, an instrument for measuring the extent of limits of distinct vision in different individuals, and consequently for determining the focal length of lenses necessary to correct imperfections of the eye. A contrivance for this purpose by M. Lehot, is described in the *Annales des Sciences d'Observation* for June, 1829, and in the notes by M. Queleteau to the French translation of Herschel's *Treatise on Light*. Its principle depends on the appearance presented by a straight line placed very near the eye, in the direction of its axis; and the principle is carried into practice by placing a thread of white silk on a narrow rule covered with black velvet, and furnished with a suitable apparatus for marking the exact points at which the thread begins and ceases to be distinctly seen, when held at a certain position with respect to the eye. An axes-instrument for the same purpose, on a different principle, had formerly been suggested by Dr. Young.

Radii is the curve of a lens, hence a plain glass of twelve inches radii is twenty-four inches focus, but a double convex lens of twelve inches radii is twelve inches focus. Biconcave means double concave and biconvex, double convex. Coquell lenses are bent glasses and are used to shade the eye, and keep out the dust. They are generally without a focus, but some are made convex and others concave.

Double focus glasses are sometimes made, of four plano lenses, cemented together on their flat surfaces with Canada Balsam. They would be much used for spectacles, being much better than the ordinary kind, but they are very expensive.

Strabismic spectacles are spectacles with curved, blackened, plates with a small hole in the center; they are used mostly for children and are used to cure strabismus, or "squint," by preventing the patient seeing except they look through the small apertures. Achromatic glasses for spectacles have been tried, but not sufficient results have been obtained to make them become general in use.

I have often been asked if spectacles with large glasses are not better than small ones. I see but one advantage in having large glasses, and that is when the spectacle frame does not fit the face, and the centers of the lenses do not come opposite the pupils of the eyes. Three-quarters of one inch is plenty large enough when set in frames that cause the center of the lens to come opposite the pupil, for the following reasons: In the first place, the glasses being small, they can be much thinner, a very decided advantage; secondly, only about one-quarter of an inch of glass can be used, because we cannot see distinctly through a glass except we look straight through, and not obliquely hence all spectacles and eye-glasses should be worn at the same angle that we generally hold the print or the paper that we are reading or writing upon; thirdly, a great many back rays of light, passing over our shoulder on the glasses, are sent back into the eyes, and never pass through the glass, which fact can be illustrated by having all of the lens that we do not use ground gray and not pol-

ished, then we will find that we can see clearer and sharper through the same lens, because there are fewer rays reflected from the polished surfaces of the glasses into the eyes. The great objection to these glasses are that they do not look quite so nice and they are more difficult to keep clean.

A great many spectacle lenses have their edges polished, it adds to the beauty, but detracts from their usefulness. I could name many more reasons why large glasses are not good, but I think I have said enough to cause opticians to think. Before I finish I would like to ask any optician who is in favor of large glasses, what is the use of putting glasses on a man's forehead or on his cheek, which is where a great portion of the large glasses go. A great many frameless spectacles and eye-glasses are now worn, and are very neat and clean. They can be washed with brush, soap and water, but the edges of the glasses should never be polished. A great many people wearing hook, or riding bow spectacles, complain of the thin nose piece cutting into the flesh of the nose, and leaving a red mark or making a sore there. If dealers would take a piece of tortoise shell and soak it in water for twenty-four hours, then to file it like a double wedge, and then warm it over the gas and bend the two small ends through the nose piece, let it cool, and it will be secure. Then they can file and polish it to suit. A little practice will enable anyone to make a very neat job and give much comfort and satisfaction to the wearer. It is also a good plan before riveting a spring upon a tortoise shell eye-glass, to soak it in water for a few hours, and then the risk of breakage will be lessened. Many people that wear spectacles complain that they cannot get an opera-glass to suit them. This can easily be corrected by the following plan: Say the person using six-inch concave glasses has a pair of twelve inch concave glasses put into the eye-piece, always allowing about one-half the power. Be it concave or convex that the person uses by doing so, the opera glass can be used by any person whose eyes are normal.

Memoranda on Soldering and Melting.

BY H. BUSH, HULL, ENGLAND.

TO hard-solder gold, silver, or other metal articles, which have previously been soft-soldered, or to melt old gold or silver for reworking, it is absolutely necessary most carefully to remove even the smallest traces of soft-solder from the articles, as heat requisite for hard-soldering would burn the soft-solder into the articles, and occasion irreparable blemishes, and in melting would make the gold or silver brittle and unworkable.

It is, however, not always an easy task to entirely remove the soft-solder by mechanical means, such as scraping, filing, cutting, etc., especially when the solder has run into hollows, interstices, engraving or chasings, to which places it is very difficult to get at with ordinary tools, and will in these instances the application of the following manipulation be of good service.

The article to be cleaned is first of all carefully heated over the flame of a lamp until the solder gets fused, when as much as possible is brushed off with a stiff tooth brush; the heating and brushing to be repeated until no more solder can be removed by brushing; the articles are then placed into a heated solution of the following compositions, which will dissolve all the remaining solder: Two ounces of sulphate of iron and one ounce of saltpetre are pounded to fine powder and boiled in a cast iron vessel in 10 ounces of water, the boiling to be kept up until the fourth part of the solution has evaporated. The vessel is then set aside for cooling, when most of the solution will turn into crystals; after two or three hours the remaining solution not yet crystallized is poured off, boiled again and set by for crystallizing, and this process to be repeated until all the solution is thus disposed of. The crystals are then dissolved in muriatic acid, in the proportion of one part of crystals to eight parts of acid; of this solution is one part diluted with four parts of water, heated, and the articles to be cleansed immersed therein, when all the solder will dissolve without injuring or discoloring the most delicate piece of work.

Views of Correspondents.

This department of THE CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

MULLER'S PATENT CHRONOMETER ESCAPEMENT.

To the Editor of the *Jeweler's Circular*:

DEAR SIR—You having kindly announced in the October issue of your valued organ, my invention of the Normal Chronometer Escapement, and published the specification of the patent in the December issue, I respectfully request you to admit these authenticated copies of opinions expressed by the most eminent and renowned horologists in Germany and Switzerland, to whom I have submitted perfect going models of the escapement for inspection and trial, and beg to thank you in anticipation for acceding to my request.

Monsieur Albert Johann, watch manufacturer in Aarau, Switzerland, author of *Allgemeines Lehrbuch der Uhrmacher Kunst*, and inventor of an improved system for hydro-pneumatic clocks: "Although I have only superficially inspected the mechanism of the going model of your escapement, I am confident that the setting in motion can be effected in the easiest possible manner, having a minimum of friction, and find the impulsion of the second balance spring, on account of its elasticity, which forms the *force constante*, very active; these two advantages I consider of great importance. Ingenious is the contrivance of the mechanism imparting the locking and releasing of the escape wheel, in such a manner as to produce the desired isochronism."

Herr Hügtenobler, watch manufacturer in Weinfelden, Switzerland editor of the *Schweizerische Uhrmacher Zeitung*: "Should it be possible to modify the movement as to make it available for pocket watches, then would it offer good prospects of application of great utility, and could be brought into common use, as it would undoubtedly be preferred to the *force constante* escapement."

Watchmakers' Association, in Berlin: At a meeting of this Association recently held, the following unanimous vote of opinion of a discussion on this escapement, was resolved: "This meeting is of the opinion that the escapement invented by Herr Müller, of Vienna, offers very notable advantages in consideration of the constant force by which the impulse is effected and its close timekeeping qualities."

Monsieur Graf Link, watch manufacturer in Romanshorn, Switzerland: "I have tried the going model you sent, and am fully confident that the escapement will be admirably for timekeepers of larger caliber and will attain the purpose designed, viz., correct timekeeping, and if it can be made available for transportable timekeepers and supersede the escapements a *casual* (pivoted detent) or a *ressort* (spring detent), neither of which, nor the duplex escapement is adapted or reliable for pocket watches, exposed to jerking and shaking in the exercise of riding, etc., a very important advantage would be obtained. The action of this escapement cannot be brought to stop in any position or under any reasonable circumstances, and I will, in response to your suggestion, try to construct watches in the manner you describe, and as I evince a high interest in this valuable invention, which, if well executed, will realize excellent results. I have resolved to start it at once, and you may please send me the articles you mention. (Translated for Herr Müller, Vienna, by H. Bush, Hall). Very respectfully yours,

AUG. E. MULLER.

THE JEWELER'S GUIDES.

To the Retail Jewelers of the Country:

GENTLEMEN—Your organizations are justly attracting much attention. Its main object, as I understand it, is to prevent unfair competition. which is a good one, but at present I fear that the means taken are futile. Your complaint is that jewelry, clocks and silversware are retailed by dry-goods, crockery and dollar stores, pawnbrokers, auction houses, manufacturers and jobbers, and even by druggists and gas-fixture dealers, so that legitimate dealers are deprived of the sales and profit. Therefore you combine not to buy of first houses who retail or who sell to irregular dealers, hoping thus to starve out the enemy. It won't work, gentlemen; the goods must be sold, and they will be bought by the people who want them, in spite of your efforts.

Now why should these outsiders pirate a business which requires skill, knowledge and capital? Did any jeweler ever put in a stock of notions, or of white goods, or of silks, or of house furnishing goods? Never. It will not pay for outsiders to go into other lines. If a crockery dealer should invest in a line of clothing, he would be driven out by the superior knowledge, the large purchases and established trade of even a very weak clothing house. How then, can it pay him

to sell clocks and watches which require the greatest skill in selection and manipulation. Simply because the jewelry trade is done on too large a margin of profit. The dry-goods man marks his goods at 25 or 35 per cent. profit; the jewelers almost invariably expect to make 50 per cent. As long as this is true, the jeweler will find it harder and harder every day to get a living. See how it works; you charge a large profit that lifts your goods out of the reach of a large number of people; sales are slow and consequently payments are slow, and you pay in four months or longer.

The dry-goods man sells cheap, turns his stock, and buys for cash, 5 or 10 per cent. cheaper than you do; then he marks at 20 and 25 per cent. profit, which makes a difference of 30 per cent. between your prices and his. Do you suppose the public won't find that out? "But," you say, "we cannot afford to sell goods so low; we have no trade 'running through' as dry-goods shops have; people come here only when they want something in our line;" and then again, "our trade lasts only during the two or three months before the holidays." Ah! there it is; other merchants pay expenses all the year round, you during only one-half or one-third. If that is so, of course they can afford to sell cheap, and of course they will—drive you out, if things go on as they are.

Now, what is the remedy? Last year the crockery men of New York found tea houses spoiling profits on their wares, by offering china at a premium to buyers, and immediately they reduced their sales by so doing. What did they do? Resolved not to buy of dealers who sold china to tea houses, and so raise up a class of jobbers who could and would sell to the largest buyers (those who give away goods or sell the cheapest) at the lowest rates? Not much. They resolved, if the tea men did not cease, to put in stocks of tea and reduce the profits on tea so that no one could afford to give premiums with purchases. You can do the same thing. Sell the goods that bear the most profit. Put in goods that will sell in summer, like sporting goods, lawn tennis and archery. You don't have the seasonal goods that people come to see. Ladies go to the ribbon shop to see a "love of a bonnet," not intending to buy, but they do buy a pocketbook, or a shawl, or a pretty pin. Are there not "loves" of cheap silver jewelry or mirrors that people will come to see, and immediately buy a bangle ring, or a flower vase, or a chateleine watch because they think it is pretty? If so, these things will enable you to pay expenses all the year round, and to sell goods as prices which will keep people from going to New York and to Chicago to get what they want.

It is the universal complaint by "out of town" jewelers the New York dealers sell the most of the fine goods to retail people in my city. Why? Because you do not keep them, or if you do you mark 75 or 100 per cent on them. "But," say you, "Tiffany & Co., and others import direct; how can I compete with them after paying profit to a jobber?" There, then, is cause of complaint; the jobbers ask too high a price, 25 or 33 per cent. advance. But why? Largely because they have to wait for money from doubtful credit. There are dealers who will sell you opera glasses at 27 cents to the franc, instead of 40 cents, and pottery at 35 cents instead of 50 cents, for cash, and young houses that will sell cheap are pushing forward every day, and you can compete successfully.

Most of the great retail houses in New York cut prices do not import; they buy, from hand to mouth, goods which they know will sell quickly and not "eat their heads off" with damage in show-room and interest, and storage, and insurance, and depreciation. But you say again, "I can't spoil the prices in town; if I sell at 25 per cent. profit, Jones will sell at 23 per cent. and so on." Exactly! and you and Jones will sell three times as many goods as you do now and keep the trade in your own town.

These are the true and only remedies for the evils you complain of, and the sooner you find it out the better, for depend upon it, gentlemen, the man who buys and sells his goods the cheapest will buy and sell the most. Now is the time to attend to this while the market is good and you do not have the competition of bankrupt stocks and poor customers incident to hard times; against the probable return of which you should be laying up money.

A TRAVELER WHO MAKES AND SELLS HIS OWN GOODS.

To the Editor of the *Jeweler's Circular*:

Your courtesy in publishing communications from your correspondents in any way beneficial to the jewelry trade, even in matters where there might be two opinions among your readers, has decided "Honestas" to call your attention to certain customs that are below the high standard of the trade. It has no doubt occurred to many of your readers that some of the buyers visiting New York and the east, while not in good standing, can afford to spend their ready cash in a business trip, thereby calling out a big flourish in

the local papers, "Mr. Blank has just returned from New York," etc. This would be a deserved compliment if they paid their bills when due, and such buyers are always welcome. Is it strange that it should excite comment when we find among the number those who are asking favors in extension of time and have failed to meet their obligations? Are they not using money that of right belongs to their creditors? Please remind them of the old proverb, "honesty is the best policy."

HONESTAS.

To the Editor Jewelers' Circular:

I would like very much to see the answer to the following communication in the columns of the JEWELERS' CIRCULAR: What do those men who travel through the country, calling themselves oculists, amount to? I refer to those who advertise as Dr. So-and-So, and when they get a victim they put a glass to said victim's eyes and examine them very critically and then pick out a glass; sometimes the first one fits and sometimes it don't. I have sold spectacles for the last ten years and I find that I hit my customers about as often on a guess, after asking a few questions, as they do. Is there a glass made that you, or rather an oculist, can look into a man's eyes with and tell anything about what kind of a glass he requires? They usually get from two to three times as much for their spectacles as the regular dealers do for the same quality of goods.

[These traveling oculists, so called, are usually quacks and mountebanks. Their use of a glass to examine the eye is simply to give them importance in the estimation of their victims. There is no instrument of this kind used by reputable oculists. That these charlatans thrive is proof that the fools are not all dead.—ED. CIRCULAR.]

The Wedding Ring.

IN the days well known to history as "once upon a time," a certain noble Roman youth was deeply engaged in the excitement of a game of ball. The occasion was an important one to him, for it was his wedding feast, but the play made him careless of a treasure that he ought to have guarded with the greatest affection. He took off his wedding ring and placed it upon the finger of a statue of Venus, to remain there until he should want it again. When, however, a few hours after he wished to take it, he found to his dismay that the stony hand had become clenched, so that it was impossible to remove the ring. He now had to pay the penalty of his rashness, for he was constantly haunted by the figure, which kept whispering in his ear, "Embrace me, I am Venus whom you have wedded. I will never restore your ring." The wretched youth continued to be followed by this disagreeable companion until, after much difficulty, he was able, with the assistance of a priest, to force the goddess of relinquish the ring, and then only was the young man free. This legend is widely spread, and has been popular under varied forms; in some of these the Virgin Mary takes the place of Venus, and the owner of the ring having, by placing it on the finger of a statue, become the betrothed of the Virgin, is obliged to renounce the world and enter a monastery. In another version a certain priest, desiring to enter the marriage state, seeks a license from the Pope, who grants his request on condition that he shall first conciliate St. Agnes, who was not only the patroness of his own church but the special preserver of virginal chastity, by placing on the finger of her image an emerald ring, sent for the purpose by the sovereign pontiff himself. The priest does as he is directed, and places the ring on the fourth finger of the figure, but his astonishment is great when the hand which had been put forward to receive the ring is returned to its original position. Attempts to withdraw the ring are ineffectual, and the unfortunate priest realizes the disagreeable truth that he is contracted to St. Agnes and can marry no one else. These stories are peculiarly interesting as exhibiting the feeling which was universally entertained in old times, that wedding and betrothal rings possessed an inherent power and value in themselves, a belief which still lingers in some places.

Finger rings have gradually declined and fallen away from the high estimation in which they were once held, so that with the exception of the wedding ring, they are now considered as nothing more than ornaments. The ring in olden times was a badge of office and a sign of the wearer's quality and power. In an old play, from which

Shakespeare obtained the rough material for one of his own, one of the characters say:—

I am a gentleman, look on my ring;
Ransome me at what thou wilt, it shall be paid.

The king's ring was a more important sign of his rank than his crown or sceptre, for with it he was wedded to his kingdom. The boy-king Henry III. was invested at Gloucester on the 28th of October, 1216, with a plain gold ring only, as no crown was forthcoming. When a king wished to delegate his power to a deputy, he knew no better way of publishing his desire to his people than by taking his ring from his own finger and giving it to the favored one. A ring would often open gates that were otherwise obdurately closed, and our old ballads and romances furnish numerous instances of their being put to such use; thus, in *King Estmere*, printed in Percy's "Reliques," we read:—

Then they pulled out a ryng of gold,
Layd itt on the porters arme;
And ever we will thes, proud porter,
Thow wilt saye us no harme.
Sore he looked on Kynge Estmere,
And sore he handled the ryng,
Then opened to them the fayre hall yates
He left for no kynd of thyng.

During centuries of superstition rings took a high place in the estimation of the people as amulets and charms, and the belief in the virtues of the materials of which the rings were made and the precious stones within them was universally held. Gyges, by using his celebrated ring, which he found on the finger of a giant's skeleton in a subterranean cavern, could make himself invisible whenever he wished. Montaigne alludes, in one of his essays, to the Platonic ring, which renders those invisible that wear it turned inward towards the palm of the hand, and adds that if such was common "a great many would hide themselves when they ought most to appear." Some rings were supposed to possess the same power as a love philtre, and the fair Helen's power over Paris, and all who saw her, was attributed by old writers to a love-inspiring ring which she wore.

Although rings are of great antiquity, and the Bible contains numerous allusions to them, some ancient nations appear to have neglected their use. Lessing in his dissertation upon the ring of Poly-crates, maintains that the Greeks did not begin to wear signet rings before the date of the Peloponnesian war (B. C. 431). The Assyrians wore bracelets and armlets, but there is no indication on their sculptured monuments of finger rings.

When rings possessed a meaning, and were accepted as the credentials of a man's position in life, it became necessary to make laws to prevent them from being improperly used; but perhaps the oldest of these laws was one enacted by Zaleucus, king, in order to reclaim the Locrians from their luxurious habits, forbade the use of gold rings by any men with the exception of braves and ruffians.

Rings have been made of all kinds of materials—as gold, silver, bronze, brass, copper, lead, amber, glass, ivory, bone and wood; some of these being chosen on account of their inexpensiveness, some on the other hand for their costliness, and others for their supposed inherent virtues.

Modern rings are of comparatively little interest, and no longer is that delicate taste to be discerned in them which the "anularius" loved to throw around his works; but many rings that have come down to us and are at present in cabinets are of great interest. The seal of Michael Angelo in the French national collection was once supposed to be of great antiquity, and a story connected with this ring illustrates the care and presence of mind necessary in a keeper of these valuable objects. The Academician, J. Hardion, was exhibiting the treasures of the Bibliothèque to the notorious Baron de Stosch, when suddenly he missed this ring. Without expressing his suspicions he sent out for a strong emetic, which he insisted on the Baron's swallowing then and there. In a few minutes he had the satisfaction of hearing the ring tinkle into the basin held before this well-known gem-collector and fabricator of antiques.

The wedding ring as we now possess it, or the "plain gold ring" as it is often lovingly called, is quite a modern invention. In the last century public opinion did not think it improper to give an artistic character to the ring consecrated to the service of joining man and woman in an indissoluble union, and it was often therefore set with precious stones. The early history of the wedding ring is very obscure, from its being usually confused with the betrothal ring, which formerly was the most important of the two; and we have therefore but little information to guide us in understanding how far a so-called wedding ring of the ancients was a betrothal and how far a wedding ring.

The Different Metals Employed in Horology.

GOLD.

The finest and costliest of all metals, ranking after iron in its spread throughout the world. Its specific weight in a pure, cast condition is 19.25; rolled or hammered, 19.65; 14 carat gold, 14.00. When heated from 0° to 100° C., it expands 1.682, or it co-efficient of expansion is 1.682, in decimals 0.001466. It is soluble in nitro-muriatic acid—a mixture of $\frac{2}{3}$ nitric and $\frac{1}{3}$ muriatic acid, and several other chlorine fluids. Also in bromine and solutions of ether. It serves as coating for many metals, due to its ability to resist the simple acids and alkalis, and as such holds no secondary rank in horology.

Owing to its hardness and elasticity, gold is often used for balance springs with best results. An alloy of 16 parts gold, 2 silver, and 8 copper is praised for its adaptability. It has a greater linear expansion than steel, and this must be considered in the compensation of the balance. It is also used on other parts of watches, such as anchors, escape wheels, &c. It is heavier than other metals (except platinum) and is the most suitable for weights and screws for compensating balance wheels, since by its greatest weight occupying the least bulk, it offers very little resistance to the air to be displaced. Another alloy of 8 parts of gold, 4 silver, and 3 palladium, is an excellent composition for pivot-bearings; it is as hard and fine-grained as steel, takes polish easily, and is not in the least attacked by oils.

PLATINUM.

Metal of white grayish color, the heaviest of all hitherto known; its specific weight is 21.20, hammered or rolled, 22.06, its co-efficient of expansion 1.1167, in decimals 0.000856. Only soluble in nitro-muriatic acid, and not influenced by any simple acids or alkalis.

It is frequently used as screws in the compensation of balance wheels, where, by its great weight it is preferable to gold; is used lately on the places of contact in galvanic batteries, since it resists oxidation longer than other metals; is also used in galvanic gilding, as sheet or strip, upon or from which the article is placed or suspended in the gold plating fluid, and possesses many advantages over zinc. It is sometimes used for cases, or as a galvanic deposit on them. Many endeavors have been made to introduce it for material for wheels, pivot bearings, balance springs, and other purposes, but the results have not been very satisfactory.

MERCURY.

A glittering white, in common temperature, fluid metal, solidifies at -39.5° and then becomes as soft as lead; it evaporates at $+40^{\circ}$. Co-efficient of expansion 1.361; specific weight 13.50. Is soluble in nitric acid. It has a decided affinity for gold, and is therefore greatly used in fire gilding. Is used in compensation for pendulums of regulators and astronomical clocks.

SILVER.

Specific weight 10.47; co-efficient of expansion 1.524, or 0.001968. Is very soft, when pure; as an alloy of 16 parts silver and 8 gold is adapted for all kinds of wheels. Soluble in nitric acid and is used in galvanic silver plating, as well as graining or first coating of watch wheel works. Has been used in compensated balance wheels, where it took the place of brass.

ALUMINUM.

The lightest of all metals; its specific weight is only 2.56; hammered, 2.70. Dissolves with ease in muriatic acid, melts quicker than brass, has a fine white color with a shade of blue, and of the consistency of silver. The graver, nevertheless, slides over it as over glass, and only incises when the metal is coated with a varnish of oil of turpentine and stearine. It is the best conductor of electricity known. Has also been used for balance springs, without any remarkable results, however.

ALUMINUM-BRONZE.

This alloy, 90 parts copper, 10 aluminum, is in universal use. It has a specific gravity of 7.7; co-efficient of expansion 1.625, or 0.001600; as hard as steel; when warm, may be hammered and rolled very thin. Many experiments have satisfactorily proven that it may

be used advantageously for wheels, parts of escapement, clickwork, pivot-bearings, &c.; is less liable to wear and tear by friction than any other metal, takes a high and beautiful polish, has a fine gold color, and resists oxidation nearly as much as gold.

NICKEL.

Specific weight 8.28; it resembles platinum in appearance, takes a fine polish, as hard as iron, and is somewhat liable to magnetism; it is not applied in its pure state in horology; can be alloyed with iron, copper, antimony, tin and zinc.

GERMAN SILVER.

Also called Packfong, argentean, and nickel silver, on the Continent, is an alloy consisting generally of 60 parts copper, 20 nickel, and 20 zinc. It has a nice white color, playing somewhat into yellow, is easily polished, and oxidizes with difficulty. Specific weight 8.7. Owing to its pretty appearance it is used in the so-called nickel movements; somewhat harder to drill, file and turn than brass, and does not retain the oil well; it is necessary to place brass linings into the pivot bearings.

COPPER.

Specific weight, cast, 7.79, hammered, 8.88; co-efficient of expansion 1.581, or 0.001722. Is nearly as tough as iron, very soft, is sometimes used in compensated pendulums, and much in vogue as electric conduits.

ZINC.

Specific weight 7.00; co-efficient of expansion 1.340, or 0.002941; is very brittle at 0° and 200°, but very flexible and may be worked easily at 100°; is often used as rods in compensation pendulums. Great care is necessary when melting it, as a sudden cooling, or the addition of antimony or arsenic, makes it brittle. It is used in galvanic gold plating, also for the preparation of soldering fluid.

TIN.

Specific weight 7.29; co-efficient of expansion 1.516, or 0.001937. It is all important by a certain class of watchmakers, who should serve as a terrible warning, however, as solder for all manners of work. Steel and brass may be nicely polished with tin files and crocus or diamondine. The so-called tin, zinc, or composition files, which are used to polish hardened steel parts, are an alloy composed of 8 parts copper, 2 tin, 1 zinc, and 1 lead. Tin possesses a peculiarity, the crackling noise when being bent, and which increases with the purity of the tin. The English is the most preferable.

BRONZE.

An alloy of changing proportions, composed of copper and tin, with an addition of zinc, lead, and sometimes iron. It is harder and more difficult to work than brass, has a darker color, and is used at present for the tools and lathes of the watchmaker. Bells of Parisian and Black Forest clocks are made of a composition of 7.8 parts bronze, 2 tin and 2.4 parts of an addition of some baser metal, lead or zinc, the latter of which may easily be recognized in the impurity of the tone.

BRASS.

Specific weight 8.39; co-efficient of expansion 1.535, or 0.001835; is an alloy of copper and zinc, and to render it more tractable, a trade of lead is added. The most of the brass for the watchmaker's use is composed of 66 parts copper, 33 zinc, and 1 lead; sometimes a trace of tin is also added. Its color, toughness, expansion and temper varies with its composition, and extreme care is requisite in the choice. Some kinds of brass may be hammered for a long time, without attaining the necessary degree of solidity, others will crack with a few strokes. Brass of a gold color contains less zinc; the color becomes brighter with the increase of zinc; it becomes more fusible and cracks easily under the hammer. That of Berlin and Augsburg is very good, the English, however, owing to its solidity and toughness, may be used to advantage for all purposes of the watchmaker.

A brass plate is very seldom homogeneous in all its parts; great differences are caused by quick and slow cooling at casting; by overheating, a piece of lighter metal endeavors to disengage itself from the heavier part, crystallizes in places, and as a consequence the

solidity and toughness are seriously affected; this can be ocularly demonstrated. Take a brass plate, and drop drops of oil on both sides at equal distances; at the spots where the oil discolours evenly, the composition of the alloy will be the same, and *vice versa*; or, heat the brass under examination and bathe it with diluted nitric acid; the surface is scoured clean and a pretty good judgment may be formed of the equality or homogeneity.

THE PREPARATION OF BRASS.

Brass, such as is sold in the market, is altogether unfit for the horologist, being too soft, porous, and does not possess any powers of resistance. German brass must be of a thickness of two or three times the body of the article desired to be obtained from it; of English, twice the thickness is enough. Before commencing to heat or hammer it, inspect both anvil and hammer, that their respective faces have good, smooth and well polished surfaces (a little tallow may be rubbed on them); inequalities on their faces are apt to create spots, and an uneven surface producing cracks. The surfaces of both the anvil and hammer should be a little rounding, the edge of the hammer blunt and smooth, with a little rounding off. Little pieces are beaten by laying the anvil upon the knee, larger ones upon one fixed and placed upon a straw matting to break the force of the blows.

If the stock of brass is not extensive, and you are forced to take an extra thick piece, begin by filing the cut sides smooth, file down the edges and strike it with equal, parallel blows, toward the side the brass is intended to extend. After having treated it thus on both sides, and no blow has penetrated too deep, leave it about one-third thicker than it is intended to be, and strike it with the flat of the hammer, with weak blows, in rows, regular strokes, moving the brass from side to side, until all traces of the hammer's edge have disappeared, the brass is nice and level, and the requisite thickness is obtained. A quality of brass may be obtained by sowing small strokes, which is worked as nicely as steel. Take care not to generate heat, which may be prevented by cooling the brass, anvil and hammer at times with water.

Irregular, too violent or strong blows quickly following each other, heat the metal, destroy the molecular cohesion, create undesirable spots, give cause to cracks and fissures, which only show themselves after the piece is finished, which has then to be thrown aside and a new one made. If the edges should crack while under treatment, file them out quickly, before continuing the blows; if they do continue, stop. The brass should be beaten as thin as possible, so that by working only the outer coating is removed; the greatest solidity will be found on the outside. The deeper you penetrate toward the heart, the softer will the metal be found to be.

If it is very thick, however, heat it carefully without bringing it to a red heat, and rub it white hot with some tallow. Too much heat ruins it for any purpose; let it be cool before continuing your blows; it is very brittle while warm. An undue heat causes ash-colored spots, which show themselves often when the piece is ready, and, of course, has to be thrown aside, much to the vexation of the workman. Long, round or square pieces are best hardened upon a drawing bench. Where none is at hand, by little strokes upon two sides, the pieces might become uneven and crack. Flat pieces may be nicely hardened by passing through the rollers.

CAST BRASS.

Cast brass is often vitreous, unyielding, "sooner breaks than bends," and cannot be hammered without cracking. A faultless cast, one which may be worked like other brass, is seldom had, and it is chiefly used for our machines and in larger clocks. Before working the fresh cast with file or graver, it is well to dip it in diluted nitric or sulphuric acid to remove all adhering substances, hard crust, &c., which are apt to ruin the working tools.

STEREO METAL.

This is a very superior composition among the many alloys of copper. It consists of 56 parts copper, 41 zinc, 2 tin and 1 iron, has a specific weight of 8.4. Its co-efficient expansion is 1.584, or 0.001712.

It is a shade more red than brass, but is preferable to it in every way. Mr. Grossman, of Glasshütte, Saxony, made some very thorough and interesting experiments with this as well as other metals, and persons interested are referred to his prize pamphlet, *The Free Anchor Movement*, by which it will be seen that it is excelled by no brass in its solidity, hardness and ductility.

IRON.

Iron is the toughest of all metals; its specific weight is 7.79; co-efficient of expansion 1.819, or 0.001220. It is universally used in steely clocks, and steeled, that is, it is heated to a certain heat in iron boxes filled with leather scraps, horn peelings, charcoal, resin or lampblack, and other processes, whereby the surface becomes as hard as glass, while the heart remains soft. An article thus treated offers greater security against breaking or cracking than one made of steel entirely and hard throughout. Good iron has a gray, glistening fibrous fracture. It loses much of its tenacity by overheating, assumes a blackish gray color, and is called "burned."

It is as soft as lead at red-heat, and may be fashioned by the hammer into any desired shape, but becomes vitreous when cold, and is easily fractured. Iron may be distinguished from steel by means of diluted sulphuric acid; one drop of this on the metallic surface of iron causes a greenish spot, while it turns black upon steel. An experienced eye also can distinguish it by the fracture.

Electro-magnets are made of soft iron, as it possesses the property to become strongly magnetized by the galvanic current, and to lose it again upon the discontinuance of the stream. Also common iron becomes magnetized but does not retain it as well as steel.

CAST IRON.

Specific weight 7.21; co-efficient of expansion 1.901, or 0.001110; mostly used only for tools and in steely clock manufacturing. It has a great affinity for carbon, and in treating it, imbibes from 2 to 6 percent., when it assumes a dead dark-gray, often black color. It has a vitreous surface, is worked with difficulty, its heart is soft, vitreous, and it is easily broken. It becomes very fluid by an addition of phosphorus or silex, and conforms to the finest forms. The lately invented malleable cast iron is a great advance in technicology, and consists in a continued red-heat of the cast, by which the imbibed carbon is burned out, and the metal thus loses the properties of cast iron.

Sulphuret—A New Metal.

M^R. SPENCE, says the *Revue Chronometrique*, by melting a certain composition of the sulphurets of iron, zinc and lead in sulphur—the exact proportions of which, however, he does not give, has produced a most remarkable alloy, and one which is already attracting universal attention in England. It has been called sulphuret.

It forms a homogeneous mass, dark gray, nearly black, upon cooling, and is of great tenacity; melts at the low temperature of 160° C., is very hard, unalterable, successfully resists all acids, alkalies, and is not affected by the atmospheric agencies. It shares the properties common to water, sulphuric acids, and a few alloys, by expanding in place of contracting when cooling, which is a very important property, and only possessed by antimony, type metal, and a few others.

Sulphuret is cheaper than lead. Its weight stands to lead as does 3.46 : 11.35; its volume at equal weight is nearly 3½ times more bulky, and costs only ¼ as much as lead. Practical men are on the eve of introducing it into type and stereotype foundries. Lead melts at 385°; type metal at 280°; sulphuret at 160° C., making it preferable to others. Upon being cast, it conforms to the finest lines of the mold. Granville Colle, a member of the Society of Arts of London, while experimenting with it, touched a pane of glass with his finger, than ran a casting over it; upon cooling, it showed all the pores of the finger. It must, however, be cast at 160° C., "sharp"; above or below this point, the matter became pasty, and is with difficulty induced to run. It receives all colors—green, bronze, blue, steel gray, and we may soon expect it manufactured into beautiful clock cases, &c.

Repairing Swiss Watches.

BY H. GANNEY.

THE center and third and fourth wheels are easily corrected by driving the third bridge in the required directions, as the third cock governs both depths. Either or both can be made deeper or shallower at pleasure. The barrel depth may be altered by driving in the same manner. We strongly advise the young jobber not to wait until a bad depth stops a watch before altering it, as it invariably injures the wheel teeth if shallow before doing so; but having a good idea of the right amount of shake, always endeavor to secure it by the ready means at disposal in all Swiss watches. Many jobbers are puzzled by the fact that many watches that come into their hands for the purpose of cleaning only, with a good character for past performance will not go at all when cleaned and put together again. This arises from the depth having been set by forcing the cocks in the required direction with the pliers the last thing, and when unscrewed these resume their original positions. A watch is more likely to stop with a pinion too large than too small. A rough and ready way to size a wheel and pinion is to gauge two or three teeth of the wheel with the pinion gauges, and see that the same number of leaves of the pinion have fair shake in the gauge. We do not give this as a scientific rule; if the jobber wants scientific rules to work with he had best change his vocation for manufacturing; and even then scientific rules, unless tempered by practical experience, will not answer all purposes, as shown by the theoretical objections dispensing with the fuzee shown by English watchmakers of the present age, and the refusal of their predecessors on scientific grounds to use a steel wheel to propel a steel cylinder. These two ideas have nearly extinguished, we believe, the English watch trade. On the other hand we may ask the strictly commercial manufacturer if, in responding to the demand in large cities for articles for mere selling purposes, he is not killing real trade which is based on honesty and public confidence, and throwing into the hands of others who claim to work on plans which will not permit of much degradation, the whole of the future trade in this art. At present his work is dependent on the watch jobber, who is fertile in expedients to secure some performance from even the most wretched trash the manufacturer can flood the market with. In Europe the jobber is always to be found to supplement with his wit, and not too particular dexterity, the want of accuracy and knowledge in the dealing portions of the trade. In America it was found that the average annual cost of keeping common watches in order was greater than their original price, and this led to the establishment of machine watch making, which now threatens to extinguish the demand for both watchmakers and repairers, who are likely to be replaced by watch architects, machinists, and laborers; but as improvements only injure those who do not choose to adopt them, the concentration of the manufacture may also involve its extension. The original machinists of the Waltham Company have left the factory some years, and have been supplying machinery to all requiring it in America or Europe to run rival factories with. Mr. Dennison, the original founder of the American system at Waltham, has been in England some years, first as the originator of the machine watch-making at Birmingham, and for some time past making cases by machinery for American watches sold in England. Whilst our English casemakers have been asking Parliament to prevent the Swiss casemaker having his cases tested for quality at Goldsmith's Hall, hoping to sweep a rival out of the market, Mr. Dennison is destroying the demand for Swiss cases by making what is wanted at the price, and maintaining the English trade and supremacy in that branch of trade. We know of several towns where the manufacture of watches is being developed, thanks to the facilities of Mr. Wycherly's system of uniform movement making, which allows other branches to work to recognized sizes, so that cases and dials can be ordered as wanted. The intelligent furnisher and escapement maker, who on account of bad trade in Coventry or Clerkenwell, or a desire to gain a wider experience and the ability to work in every civilized community, turns

jobber, carries the seeds of a successful manufacture wherever he goes, and supplementing slack seasons at jobbing with new work, builds up a reputation for himself or the firm that engages him. I expect to see in the future a powerful antagonism between this system and the factory system, if there is intelligence enough in those who, following new work at home for a livelihood, are capable of moving with the times. The greater part of those connected with the English watch trade will never work in workshops other than their own, because it would involve a loss of the capital and social position they at present occupy; and the trade will either dissolve and evaporate as now conducted, or mutually co-operate to serve their own and the public interests. At present all are too antagonistic, and the bill-sticker is the most important factor in making and sustaining horological reputations in this country.

A thorough circulation of ideas of the trade is the best correction of defects either of ignorance or of arrogance. I have enlarged on the present style of watchmaking, as it is possible that this method will only be retained in the jobbing trade. The bow and turns, the old nail and bit of cork, ousted like the weaver's distaff from the weaver's hands as too slow for manufacturing purposes, will linger in the repairing shop, and by their adaptability to ever-varying requirements, maintain their supremacy. A constant changing of tools and methods of work is as much to be deprecated as a refusal to adopt new methods. The jobber may make up his mind to use the most simple tools, and rely upon himself for their application, and also for their construction. I do not find purchased tools last long, and the ability developed in making tools is capital practice for their application. Punches and drills should never be bought. The ends of English pivot broaches we always used for making drills, and they are the only steel we found capable of drilling hardened and tempered steel, holding them in the flame of a candle (gas spoilt them), and then a rapid shake through the air hardened them, or they could be put in the candle itself quickly. This was the orthodox fashion, and other methods and drills may answer for other purposes; but this is the only drill we can depend upon for a good job, the ordinary Swiss drill being much too flexible and poor steel.

We will now endeavor to indicate the more ordinary causes of failure and their remedies, as heroic remedies are neither profitable or necessary to the repairer, who is required to make the best of what is already in the watch. Deficiencies at both extremes of the movement constitute at least 90 per cent. of the troubles of watch work, want of freedom and security of the mainspring and its immediate connections with click work and stop work form one large part, and want of freedom for the balance and its immediate connections with the escapement constitutes the other portion. The most interesting feature connected with Swiss work, the excellent system by which they produce the horizontal escapement, constitutes a perfection of production that has not been surpassed by the highly extolled American system, who have applied to all parts of the watch the same plans which enables a repairer of Swiss watches in any part of the world to send a part of his escapement, or its number on the gauge, to any material warehouse, and receive a corresponding part which may be easily and surely fitted without fear of error or necessity of alteration.

American watch and clock production should be impossible for another century; by the true laws of political economy and relative value of labor in the old and new worlds, and owes its existence to the fact that the English and European worker has no faith in himself or his future; untaught by past experience he refuses to extend his appliances, except under compulsion. He makes wheels and pinions by reproductive tools, because these cannot be perfectly produced by the file and hand tooling, though in clock pinions, even now in England, only the spaces are cut by the engine, and the rounding the pinion must be done with a file by hand. This fact illustrates the peculiar spirit so long dominating the trade, and accounts for the absence of the clock manufacture from the list of modern English trades; it is necessary the watch repairer should understand and ap-

preciate these ideas, as he is called upon to counteract or remedy, on the mass of cheap work, not damage or wear, but faults of construction; and errors arising therefrom; some parts of ordinary Swiss watches are not mechanically adapted for the work they have to perform. The whole of the barrel work generally is essentially unsound and rotten, even in horizontal work, and when additional trouble is added with the strong lever mainspring and escapement to the same caliber, endless is the annoyance thereof. It is often urged by apologists the Swiss click worn is well enough if very well made; and if mainsprings are weak and all parts sound this is no argument, as a good mechanical device will stand the test of cheap and rough construction and usage and still give useful results. Ratchets, which are efficient in proportion to their size, are not now more than half the diameter they used to be made, and, as a consequence, have not half the retentive power over the mainspring or strength of teeth and click. Looking at old Swiss make of watches, such as Lepine, we see the ratchet, just free of center wheel, which is what restricts its diameter, which may otherwise be as large as the barrel, as is the case in keyless watches, with advantage. It is an axiom in other than Swiss centers of manufacture, never to wind a mainspring more than half a turn, lest something happens, and the rapidity with which a new watch is passed on to somebody else, as soon as it ticks, is the only explanation that can be given of the neglect of this portion of the Swiss watch, making it usually more unstable and delicate than the much abused and unnecessary fuzee and chain and maintaining work, with its thousand parts and complications. We quite despair of indicating to the young repairer the means of rectifying the errors of this part of the watch. A ratchet and click that fails is not made secure by refiling its worn teeth and click. As diameter is more diminished, if excessive strength of click spring is the cause of the ratchet cutting it, its strength should be weakened by filing its spring; and in reshaping the click, see no angle is formed that may cause the ratchet to drive the click up out of the teeth or down the barrel, and that a good steady pin or pressure on the plate keeps the click steady, and that its screws and the bar screws are perfectly reliable. The hole and bars for sustaining and covering the barrel arbor are usually too thin, and of insufficient thickness, both for a sound hole for the arbor to work in or to hold the four screws which secure the whole together. These screws as often as otherwise being transferred into rivets, the watch cleaner not caring or able to secure a holding otherwise. A radical reform in this part of the watch, may be effected when the barrel bar is too thin to hold a screw thread properly, by reversing the screws and putting a new small bar of good brass or steel, in which the screws are tapped, the heads being carefully countersunk and freed of the barrel. This method, if adopted in making all bar watches originally, would be a great improvement, and save much trouble and unsoundness. The stop work is such a frequent cause of failure that a majority of the watches in wear have them removed. A badly made stop work is generally not capable of being repaired. The usual plan of making the pieces equal size, or the upside down piece the largest, is the great cause of trouble, producing a gearing as likely to stick as to revolve. The action is really the same as a series of roller and lever actions, and the points so important to freedom and safety of action are the same. Putting a larger star wheel, and reducing the size of the comet wheel, will generally secure a good stop work. Considerable difficulty will be found in turning the comet true, and there are tools attached to some lathes for reducing it. But a very good job may be made by turning a ring in its surface, and filing up to it in the hand, and finishing it off in the turns with the graver and burnisher. The smaller the circle of the comet the safer and less likely to stick are the arcs of the star wheel, which should be fitted with least possible amount of side shake, and all sharp corners carefully rounded. If the screw and socket are damaged a hollow stopping should be riveted in the barrel cover, and the screw dispensed with, the hub for the star wheel to work on being turned true on an arbor, and slightly undercut, and the star wheel being slit through and forced over the boss, like an index on a cock;

this is the method used in fitting the best stop works to English going barrels, and is quicker and sounder than the screw, which lacks both strength and freedom, and often works out by the action of the pieces. —*Watchmaker, Jeweler and Silversmith—British.*

Adjusting and Repairing Watches.

THE speed and precision of a watchmaker engaged at his work is due greatly to the method pursued. The good old masters had their immutable, incarnate customs, and nothing in the world could have induced them to deviate from them. They consumed much time in their labors, because every article was difficult to be made, but the vexatious coming back of the work as unsatisfactory was obviated at the same time, such as is the case too often at the present day with our growing up horologists. A method, a system is wasting time! If they would only accustom themselves from the very first day forward to a reasonable, well-defined routine, they would soon find that their labors are greatly easier, more speedy and correct.

It must not be understood, however, that a method should be unalterable, and, once established, should never be deviated from. Far from it. Circumstances may and do arise to compel the workmen to do so.

These remarks were deemed necessary, because many a watchmaker might say that the system pointed out below is too long and cumbersome. The response will be, and let the young men commit it to memory, that he is in error, and every conscientious watchmaker will sustain me in saying that no one can be too careful at the beginning; time and experience may teach the young watchmaker how to shorten his labors, but until then let him be as pains taking as possible.

Is it not a cause for great vexation and anger, not to mention the loss of time, when a piece of work, which was not done well at first, let it be the cleaning or the repairing of a watch, has to be taken apart and done over again? Is not the labor market already overstocked with journeymen whose work only commences from the time that they report it as finished, and ready for delivery? How many pieces of work are returned, how many a disagreeable criticism is the careless workmen compelled to listen to, what loss of time and consequently money is connected with it? All these are things which should be well weighed by the beginner, and receive their due attention as things to be shunned, and their occurrences may be obviated by the pursuit of a well-ordered, reasonable, systematized method.

PRELIMINARY AND OUTWARD EXAMINATION OF A WATCH.

Case, Crystal, Dial and Dust-Cap.—Examine by a careful scrutiny of the case, if the watch has sustained a fall, knock or pressure; if the joints close well and if the case springs are in good order; if the hands, upon being turned, rub on the crystal or dial plate, or catch each other; if there is sufficient play room between the head of the minute hand and crystal; in case you are not satisfied, press your fingernail against the center of the crystal, or lay a piece of silk paper upon the head, then close and knock against the case; if there is sufficient play the paper will fall off.

The setting square must be rounded and be somewhat lower than the dust-cap, to prevent an accidental pressure upon the case from reaching it; it must not be cramped in the hole of the dust cap.

There must be plenty of play in the following places: between the case rim and the case springs on the one side, and the teeth of the barrel, the banking pin or the balance on the other side; by riveted joints between their folds and the bridges. There is a number of defects which only occur with the closing of the dust-cap, and are often difficult to be found, as they do not occur regularly; to this may be classed also the moving forward of the regulating plate, or being too close to the dust cap, which is best remedied by a little turning out of the latter. If you are not satisfied, mix a little oil and red, anoint the balance bridge with it, also the little bridge carrying the stud, close the watch, and while augmenting the pressure upon the case, hold it to the ear. If it should stop, see where the red has left its print, and remedy the fault either by lowering the bridge or by turning out the cap; or if none of these means can be made use of, locate in the

plate, close to the balance, one or two screws with heads, higher than the highest parts of the movement, under which the balance may pass, and which thus receives and resists any extraneous pressure. These screws are indispensable in many gold watches with thin cases and dust-caps.

Next see that the dial is located square and exposed to no pressure from the joint of the crystal rim, when the watch opens from the face; if such this happen, wear down the dial rim with an emery stick; examine if the hands are placed right, and that the head of the minute hand does not press upon that of the hour hand; that no friction occurs between the neck of the minute and hour wheels, or the canon of the second hand in the holes of the dial plate; the amount of play between plate and hour wheel; if not enough, either grind down the wheel canon or enlarge the hole; if too much, remedy by an underlay of foil.

Next examine the setting square, by turning it with a key, that it does not go too hard and too easy by turns, that the minute hand does not stand too high or too low by turns—defects caused by a malposition of the center wheel, an untrue hole of the pinion, or a bent center staff.

When satisfied that the watch does not rattle in the case, a defect to be overcome by inserting a few pins in the plate, or by a careful drawing in of the case rim upon a small anvil, take the works out of the case, take off the hands, best done in the case of fine watches by two flat pieces of ivory, in common ones with a pair of tweezers, examine the play of the hour wheel, lift off the dial plate, and see if it presses anywhere on the minute pinion, stop-works or coverlid; if so, correct the fault by grinding the offending part of the dial on the emery wheel; instead of this, the diamond disc may be used. If none of these are on hand, flatten a lead ball, fasten it on the lathe, use emery and water and grind down sufficiently. Do not permit the dial to touch the watch plate on the places where the oil sinks are located; if it does, rectify the defect.

EXAMINATION OF THE MOVEMENT.

Hands.—Rotate the hands by means of a key and see how the different depths are proportioned to each other; the wheels must not rub against each other, neither on the barrel, nor on the stop-work. Examine the position of the barrel, that it does not stand obliquely; if it does, and the fault is overlooked, much mischief might be caused, as it gives the observer a wrong idea of its playroom.

The arbor of the center wheel must turn smooth in the hole of the center pinion; the canon pinion must be located firmly upon it, thus that it cannot move up and retain the arbor in the pinion. The setting square should be the least trifle smaller than the winding-up square. If any corrections have to be made on the hands or their moving parts, it were best done at once, when taking the watch to pieces; it might be forgotten afterward.

Round off the canon pinion, also the little dust plate, from below, and remove any collection of dirt or fibres from the teeth of the first; both must ride upon the somewhat projecting ends of the pivot of the center wheel, at a certain distance, at the same time, from both plate and bridge. The minute pinion should be somewhat shorter than its pin, and the surface of the pinion well polished.

Play of Wheels and Pinion.—Examine the space between the barrel and the sink in the plate; also if the barrel teeth are sufficiently far from the plate; next examine the space between barrel and center wheel, the play among the wheels, and with regard to their plate sinks and bridges; the center wheel may at times touch the barrel bridge, its own, or on the third-wheel bridge, or some prominent pin; the fourth wheel on the jewel hole of the escape wheel or its setting, or the wheels among themselves, if of unequal thickness or if they don't run true.

Next see if the balance wheel banks or touches against anything; the distance from the lower side of the center wheel, of its bridge, from the balance spring pin and its stud, and lastly look at the space for the balance spring, and position and size of same. The play room of the wheels may be ascertained by seizing them one after the

other by their shanks and moving them up and down, which gives at the same time the play of the pivots. This can be done also with the horizontal wheel, but should its bridge be weak, a careful pressure with a sharpened cleaning stick upon the outer end of the bridge, causing the end of the pivot to protrude somewhat, will acquaint the examiner with the condition. At the same time see that the sink in the horizontal wheel bridge is of breadth and depth sufficient for the teeth to permit them entire freedom.

Raise the watch as high as the eye, and raise the balance wheel carefully with a sharpened cleaning stick several times; by the change in the little space between the collet and jewel hole you can easily judge of the play of the balance wheel.

Escapement.—The play of the balance wheel pivots within the jewel hole can, after a little experience, easily be judged by sight and touch; by looking with a strong glass through the cap jewel, and observing the motion while the watch lies flat. Should the cap jewel be not sufficiently transparent remove the lower one, and after due inspection replace it and repeat the operation for the other one.

The banking of the banking pin on the banking stud must take place thus that the wheel be not brought back, or that a tooth of the horizontal wheel can catch neither inwardly nor outwardly. The banking pin is apt to approach at times too closely to the arbor or the fourth wheel pinion; this causes very disagreeable disturbances, especially if it is not truly round; an oxide will form and collect around the banking pin in damp and cloudy countries, which causes an occasional gluing; the watch begins to go when opened, and it is hard sometimes to detect the fault. A slight scraping with a graver will remedy the defect. The horizontal wheel does not run true at all times, and sometimes by flat wheels, when the cut for the passage of the wheel bottom is extra wide, an entire tooth is apt to pass through, when the watch is held in a certain position; and it sometimes happens if the cut is not straight that a tooth will catch in it. The wheel bottom may, if the wheel is of unequal thickness, and does not run true, scrape against the inner rim of the lower plug. The wheel bottom should pass in the center of the cut, run true and exact, and both cylinder and wheel should have as contracted a play as is consistent.

A correction of the horizontal wheel, if it does not run true, can be made upon a small brass anvil which has a hole in the center for the pinion, placed upon the bench or fastened in the vice; place a little punch of the shape of a rounded off chisel upon it, or strike the wheel direct with the edge of the hammer. But be very, very careful. Being satisfied that the balance spring lies well and flat, that its coiling and uncoiling proceeds with regularity, and it is not hindered or cramped by anything, that it neither touches the center wheel nor the bridge, nor that its second coil touches the fork or stud, the preliminary examination of the movement may be closed, if it is a watch which has heretofore been a good timekeeper and needs only to be cleaned. When, however, you have one before you, which has rendered only poor service, or when an adjustment of a new movement is under scrutiny, the different functions of the escapement should be inspected most thoroughly.

Equalizing or Adjusting the Horizontal Wheel Teeth.—Horizontal wheels are furnished at so low a price, that it should excite no wonder if the quality is corresponding. Especially its teeth are so unequal, some short, some long, that an equal motion of the cylinder is out of the question. It is therefore necessary to separately take each tooth and rectify it to bring them into harmony. The simplest way is to mark upon an arbor a place a shade larger than the cylinder, and measure by this the interval between the different teeth. Teeth which are too long, and by which the arbor will not pass, have to be ground down at their points by a ruby file, rounding them from inside to outside, by holding the wheel between the thumb and forefinger of the left hand, using the file with the right. Press very gently, since the teeth are very fragile and easily broken. Having adjusted and equalized all the teeth, polish with red.

Now replace all parts of the escapement, and observe the working

of the wheel upon the cylinder; to retain this introduce a piece of paper between balance and plate. The rule that a cylinder escapement should lift 40 degrees, that is, the balance must describe an angle from the drop of one tooth to that of the next, of 40°, holds good only for carefully constructed escapements. There are many deviations from it in practice.—*Handbuch für Uhrmacher.*

(To be continued.)

English Watch Repairing.

By HENRY GANNEY.

IT has become the fashion in some quarters to decry the value of the bow and turns as a modern instrument for turning, and I feel it just to give the most valuable testimony I ever received as to its efficiency, whilst examining the beautiful machinery and its products at the Elgin (Illinois) Watch Factory, and discussing the question of fine pivoting with Mr. Moseley, the superintendent of the factory. His testimony may be considered as opposed to his own interests, for he told me he had tested many thousands of pivots for watches of all nationalities, and with delicate micrometer gauges, and only in the highest classes of watches, of London make, had he been able to find pivots that were truly cylindrical under careful testing; and though his pivoting machinery there was the best then used, and producing square pivots and shoulders far above the average of work in general use in Europe, he did not believe it possible to equal with any lathe the best effort of the best London workmen with bow and turn. Speed, power and live centres on lathes being inimical to fine, true turning. On the other hand we have Messrs. Guey, in Clerkenwell, claiming to pivot by machine equal to the best hand work, at a saving of 80 per cent. on the cost of their previous outlay in that department of work. Both may give a true experience. Mr. Moseley, a scientific mechanician, making machines for watch work; Mr. Guey, a scientific horologist, adapting machines for his own wants and higher susceptibilities in that particular department.

In connection with watch repairing, I find it difficult to discover any new methods or tools which will render useless and unnecessary the older plans and methods. A careful examination of the tool warehouses of Clerkenwell and the West End of London shows us several tools based on American machine tools, which have merits that commend them to the attention of producers of new work, and of occasional usefulness to repairers, such as lathes with split chucks for holding drills, screws, etc., and for ordinary turning and polishing operations. These show advantages over ordinary screw-making and polishing appliances, though to obtain the best results it seems desirable that one lathe and its appliances should be exclusively used for the same purpose.

A tendency to rely on tools is not desirable, and is not characteristic of the really good workman. Every good workman tests with his eye the work of his tools, and would repudiate gauging pivots to see if he is making any two, on the same staff or pinion, the same size; a good pivoter with bow and turns on new work will make a pallet staff to good work, with highly finished pivots and shoulders, in less than half an hour, and a balance, with roller and collet fitted, and all heights and freedoms right, and balance truly riveted, in an hour, so we do not need a quicker lathe for jobbing purposes. The jeweler's cement lathe is certainly worth using, if one can acquire the jeweler's skill with it. I have seen some jobbers who did all their work well and quickly, and as the jeweler does some wonderfully fine drilling and turning on more intractable material than steel, there appears no reason why it should not do more work in the other fine turning required in watches. I have seen abroad, staffs, verges and pinions done very well with it, and in putting in pivots decided advantages, as the center could be cut with the graver and the drill cutting in only one direction, in making the hole, did its work quicker and better. We had, some years ago, in Clerkenwell, a very clever pivoter, named Seymour, who worked on

this system, and whose place has never been filled, who, with the cement lathe, would put a new pivot in a few minutes, while waiting, for such a small sum that no one ever thought it worth while doing the job themselves in his time. He was a real benefactor to the vertical watchmaker or jobber, an inside scape wheel pivot being restored without the trouble otherwise necessary, and certain injury to the truth of wheel teeth involved in taking off and riveting the balance wheel. He had no pupils, and I have met only one watchmaker, a Yankee jobber, who appeared to rival him. A considerable amount of practice appears to be requisite for success. Any light lathe, with a projecting post or head to hold a piece of stout brass wire, about the diameter of turn centres, will answer the purpose for practising some of the operations; a balance tool or English screw-head tool, with a piece of brass fixed in it, and the ordinary bow, will do well enough to begin with. The first operation consists in finding the centre with a graver, and turning out a chamfer, and drilling a hole to receive the arbor. If a pinion or staff the hole may be as large again as the staff that goes in it, and then some shellac, or, better still, jeweler's cement, must be melted on, in and around the hole, with a spirit lamp, and the pinion inserted while the cement is warm; and ere it sets the head is revolved and the piece is touched with a peg or the thumb nail while revolving, at the shoulder or other true portion of its surface, so that it sets in the cement perfectly true and flat. It is the work of a few seconds and must be begun and finished while the cement is hardening. The centre of pinion must be cut with a graver carefully, and a drill, made from a pivot broach of English make, whetted chisel-shaped, and lubricated with turpentine spirit, will make a hole in any steel that has been turned with the graver without the necessity of tempering; the drill should be hardened by heating in a candle flame (gas burns the steel), rapidly withdrawn and waved in the air or plunged in the candle quickly. If plunged in bees-wax the drill is tougher, but not so hard as when put in a potato, which is a favorite method with some workmen.

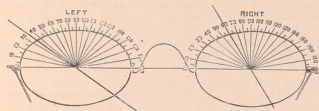
Polishing the blade of the drill on the finger with a piece of stone and holding the body of the drill near the flame and letting the heat run up, and changing the blade to light straw for steel, and blue for brass, are the various plans I have seen and used when good drills were more common than now. Drilling holes in verge balance edges for banking pins, developed skill in drill making and using. All drills were then made from broken English broaches, for the reason that nothing else would do the work. Needles were failures. The hole in the pinion being deep enough and well cleaned out, a piece of steel for the pivot is carefully filed as straight as possible, pushed in with a good tight fit about half way up the hole; the pin vice is held straight, one smart blow with the hammer drives the pivot home without dislocating the cement, the pivot is nipped off, then turned true, and polished or burnished, and the pinion removed by warming the nose of the tool slightly, and pulling the pinion away before the cement melts. If cement adheres the pinion must be put in spirits of wine.

Frequency of Astigmatism.

IT is well known that a slight amount of this defect is normal, as it has been shown that the anterior surface of the cornea is not part of a sphere, but of an ellipsoid, having three axes, so that rays falling near the vertical meridian have a shorter focus than those passing through the horizontal meridian. The surfaces of the crystalline lens are also not spherical but as the maxima of curvature in the lens and the cornea are at right angles to each other, a partial correction results, leaving the average eye the subject of what is called normal regular astigmatism. Curiously enough, cases do occur where these maxima and minima of curvature coincide in direction, so that if we designate the total astigmatism of the eye by ta ; let the astigmatism of the cornea $per se$ be a ; and that of the lens $per se$ be a' ; but a is always $> a'$. If then, the maxima of curvature coincide we shall find $ta = a + a'$. Usually these maxima are at right angles to each

other, and then $ta = ac - al$. Since ac is always $> al$, ta never quite becomes $= 0$, and never can become $= 2(a\epsilon)$, hence the limits of ta are 0 and $2(a\epsilon)$.

Abnormal regular astigmatism embraces all cases needing correction, and is practically divided into *simple*, *compound* and *mixed* astigmatism, as shown hereafter. It is easy to see that the greater the refractive disparity of the two meridians the less the acuity of vision, which is usually expressed as a fraction $V = \frac{1}{2}$ normal, *i. e.*, if the eye sees at 20 ft. what it *ought* to see at 20 ft. It only can see at 10 ft. what it *ought* to see at 20 ft., we say, $V = \frac{1}{2}$ and so on. This and the test-types are based on the physiological fact that, as a rule, an object must subtend an angle of 5 minutes ($5'$) of arc at the retina to be distinctly visible.



O.D. +1.8 spherical $\odot$ +1.16 cyl. axis 60°

O.S. +1.10 spherical $\odot$ +1.20 cyl. axis 35°

($\odot$ = "combined with")

In high grades of astigmatism the value of V is much decreased by *chromatic aberration*, as may be well shown by *Donders' method*.

Let the person view the candle-flame in a dark room by means of a dark cobalt blue glass; if he have Am. (myopic astigmatism) he will see a red flame with a blue border; if suffering from Ah. (hypermetropic astigmatism) the flame will be blue and the border red.

The amount of astigmatism may be measured *objectively* by those accustomed to use the Loring-Knapp form of ophthalmoscope, in observing the upright image of the fundus oculi. If astigmatism be present, the five choroidal vessels will curiously vary in distinctness; a certain spherical lens behind the mirror will bring out all lying in a certain meridian with great distinctness, while all the five details lying in the meridian at right angles to the first will require the spherical lens to be changed. This is precisely the way we measure *myopia* or *hypermetropia*, except that in them we observe what lens is required to define the details of the fundus *generally*, the accommodation of both individuals being *relaxed* as far as possible. If the observer be emmetropic, the lens required indicates the refraction of the patient's eye.

I have noticed that *high* grades of astigmatism are sometimes well shown by the un-symmetry of the cornea, as indicated by the distorted image reflected from its surface.

To confirm the diagnosis it is necessary to use a blackened disc of brass or cardboard, perforated by a slit cut in the direction of one of the diameters of the disc, said slit being of moderate length, but not over 1 mm. wide.

The disc being held *close* to the eye, and the test-type being seen *through* the slit while the disc is *rotated*, so that the slit shall successively pass over the various corneal meridians, it will be found that there are two positions of the slit which will give the maximum and minimum acuity of vision, thus indicating the astigmatic meridians. If we now interpose various spherical lenses along the visual axis, we shall be able to correct first one meridian and then the other, after bringing up the vision to $\frac{1}{2}$, or nearly so. If we provide a graduated clip to hold the disc, we may read off the angle of the astigmatic meridian at once, near enough for all practical purposes, of course keeping the axis of rotation as nearly coincident with the axis of the visual rays as possible. Thorough paralysis of accommodation makes the astigmatism easy to detect, because the dilatation of the pupil increases the circles of dispersion, and makes them more apparent to the patient.

The various radiating figures and concentric circles, some of which have appeared in the E. M., and innumerable varieties of which have been devised years ago, may also be used—the best I have ever seen being those suggested by the late Dr. Pray. They consist of large capital letters, the strokes of which are made of parallel lines drawn at varying angles to the vertical, each letter, of course, having its lines parallel. The letters being carefully printed square with the edges of the paper, if the sheet is attached to the wall of the room truly, it is sufficient for the patient to tell you "which letter is blackest and most distinct," and you can at once read off the angle of his astigmatic meridian to the horizon, the head, of course, carefully being held as erect as possible.

With these means a practised surgeon can, in an hour or so in ordinary cases, accurately adjust proper glasses. I object to giving these things into the hands of opticians for the same reason that I do not care to see cases of *fracture* sent to my *splint-maker*. Astigmatism is a serious thing, and its adjustment requires a dozen precautions and careful study about things whose various names the average optician *never heard of*. I have seen too many eyes injured by "trying on glasses" at an optician's shop, and picking out what they (the patients) like. This is all wrong.

An invalid might as well go to a chemist's shop and "try" a dose from each *consecutive bottle* on his shelves, and with as great prospect of relief.

Abnormal *irregular* astigmatism is, of course, very difficult to treat, each case being a study of itself, and is, unfortunately, not seldom irremediable. I have already spoken of the *varieties* of astigmatism by name. *Simple A.* is where one meridian is *normal* and the other is astigmatic.

Compound Astigmatism exists when myopia or hypermetropia is combined with an astigmatic variation of the same name. *Mixed* astigmatism is present when one meridian is myopic, and the other is hypermetropic.

We find most astigmatism among civilized nations and educated individuals, because minor degrees do not become annoying, except for near work, anything always seen at the "far-point" is frequently not affected, except the astigmatism be of rather high grade.

It is said (H. Cohn, "Untersuch von 10,060 Schulkinder," Leipzig, 1867) to exist in *one-fifth* of 1 per cent. of *all* children, and in $\frac{1}{2}$ per cent. of *all ametropes*. We generally find more in private practice than in hospital and dispensary work.

In our Eye and Ear Hospital we have treated, in 11 years, ending Jan. 1, 1880, 20,657 eye cases, of which 1,433 have had *refractive* trouble, viz., 597 presbyopes, 584 hypermetropes, 333 myopes, and 218 astigmatics, of all varieties, that is, rather more than 1 per cent. of all refractive cases.

Brooklyn, N. Y., Dec. 3.

ROI NE PUIS, SOUSA JE SUIS.

Collection of Customs.

A CHANGE in the methods of collecting customs at Havana causes much delay in the delivery of goods sent to merchants in Cuba. Heretofore it has been the practice for the customs officers to examine packages of merchandise on the dock immediately on the arrival of the steamer, such examination being rather superficial than otherwise. On account of reports that a large amount of smuggling was going on, a change in the practice has been made, and now all goods are sent to general stores. Here they are examined very critically at the leisure of the authorities, whose normal condition is one of indolence. As these gentlemen are fond of leisure, the examination progresses but slowly, and great delay in the delivery of contents is the result. The general stores are now crowded with goods of all kinds, and there is little prospect of their being cleared out at an early day. No objection is made to the exercise of every precaution against smuggling; but the delay in delivering goods is a great annoyance to merchants and shippers.

Gem Engraving.

BY AN EXPERT.

IN intaglio engraving, as your work progresses, you should take frequent proofs in sealing wax; this is essential for several reasons. First to judge of your relief; this is done with much more precision in a wax impression than when seen in the stone. In regard to the amount of relief in this kind of engraving; this differs with most workmen, some advocating a very high relief, while others choose a style almost as low as the impression on modern coins. A compromise between the two seems to be about the thing, although the subject would modify it to some extent; for example, a whole length figure would admit of higher relief in proportion than a simple head. Another reason for frequent proofs is, everything is reversed from your model, and consequently more difficult to compare. We have now arrived at a place of stage of our work when new and special tools come into use. Among these a cone-shaped cutter as shown at

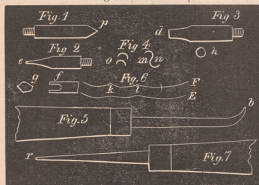


Fig. 1, the angle of the cutting point *p*, should be about 60 degrees, or more (that is, making the cut broader and shallower); but a cutter with an angle of more than 90 degrees is a little uncertain in its action, and apt to *crawl*, or get to one side of where you want it. Of course it is understood that this tool is made of steel, and the point *p* charged with diamond-dust. A diamond drill should be used to precede the cone-shaped cutter, as such a cone of itself penetrates of itself but slowly; and the drill can be used in many places where the cone is not necessary. Such a drill can be made as shown at Fig. 2. A piece of steel wire is turned as shown and a hole is drilled at *c* as large as is consistent with strength to retain the piece of diamond used for a drill. In the cut the drill is magnified; but one cutting a hole, about 1-40 or 1-50 of an inch in diameter is the right size. When you are breaking up a diamond cap jewel or other small diamond, to make diamond dust, give the plunger one good blow and then remove it, and you will find several pieces of the size of grains of sand; one of these selected of the proper shape can be forced by light blows or pressure into the hole at *c*. At *t* and *g* are shown the drilled hole, and diamond splinter still more magnified. If you should buy *bort* (particles of diamond) you will have no difficulty in selecting a piece. Diamond fragments are frequently quite long and splint-shaped, but a piece somewhat like the one represented at *g* is the surest shape. It should be large enough so that it will cut a hole a trifle larger than the steel holder *c*. A little hard solder can be fused around the diamond point, or yellow brass (common sheet brass) used like hard solder. But you will find the piece of diamond will usually stay well enough. It is well after drilling to examine and see if the point of the drill is all right; and the drill laid away when not in use in cavity or groove, so that if the little diamond chip drops out it can be found. Drill in as deep as you intend to go with the cone cutter, and it is easily and rapidly done, to countersink with the cone. Such a cutter (cone shaped) is used principally in letters, still it is useful in other work. Another form of cutter is shown at Fig. 3. This is simply a hollow cylinder, and is turned to the size required, and a hole drilled into the end as shown at *h*, (which is an end view) and also at the dotted lines *d*; in these cutters only the

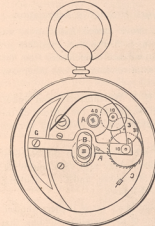
edge of the cylinder is charge. Several sizes of this kind will be required, as they are useful in letters, and in cutting the curls and waved lines of hair. These cutters are seldom used to produce full circles, but for crescent-shaped incisions, as shown in Fig. 4. These can be joined as seen at *m*, *n*, or used separate as at *o*. The edges of these cutters will need refilling with diamond dust quite often. The tool shown at Fig. 5 is a hand tool entirely, and is made of soft steel and shaped as shown. The small end should not be more than 1-50 of an inch in diameter; the end *h* is charged with diamond dust. The point *h* does not want to be slim, but taper rapidly as shown, and the extreme point quite small. The tool shown at Fig. 7 is another hand tool. This too, is made of soft steel, but has a slim, tapering point, and the extreme tip is a splinter of diamond brazed in. This tool is used to scratch and scrape portions of the work to which the revolving cutters cannot be well applied. If you have a line you wish to deepen, this tool can be wet in the mouth (or dipped in water) and moved back and forth, and a channel will soon be cut which can be deepened and modified, the tool shown at Fig. 5, only this tool is used with oil. Work done with these two last described tools is tedious, but they amply pay one for the time, if the work in hand is something to be proud of. And they act more rapidly than one would suppose, and it is also to be born in mind that they are only used in those places which do not admit of other methods. Another use to which the tool at Fig. 5 can be applied, is in working up the flesh and features of a head. The pupil will see that all work done with globe and convex edge cutters must leave angles formed by the meeting of two curved lines, as shown (in greatly enlarged scale) at *k*, *l*, Fig. 6. The line at *F*, Fig. 6 might be supposed to represent the cross section of a profile face we are cutting. A proof in wax from a head like this would be hard and unnatural. Now we take the tool at Fig. 5 and turn it down on one side, as shown in the cut, and use the tool as if it was a burnish. The harsh angles at *k* and *l* will soon disappear, and the line at *F* will appear as shown at *E*. Portions of the features, like the nose—especially the nostrils—and ears, can be given a grace and freedom which could not be obtained with revolving cutters. It will be well in modeling, to at all times bear in mind the ultimate result—or in other words think all the time you are modeling—well how am I going to cut this? and how will be the most expeditious way to finish that? I made mention of the tool shown in Fig. 3 as being sometimes used in cutting curls and wavy lines in hair; but don't for a moment imagine that any one tool can be used to produce the appearance of human hair, or any ten tools. There is no one part of gem engraving more difficult than producing elegant and gracefully arranged hair; and still it is much easier to engrave than to model it, and it is almost as difficult as both combined to tell how to do it. To get correct ideas and taste, it is best to stick to modeling until you can produce at least hair of respectable appearance. In studying hair, (as artists say) you must forget (so to say) that there are any single hairs, but see it and represent it in masses—that is, as locks or curls—the human hair has a great tendency to combine and get into locks; analyze this characteristic, see just about how many locks it would naturally divide into, and how they would be affected by the situation they occupy; that is, the hair on the forehead is pushed back from over the eyes—if too long, will be parted as well as pushed upward. Study the clusters of locks about the ears, and the fall on the shoulder; here is where the first natural curls commence, as masses; those little curls about the temples are not locks or masses, but straggling combinations of only a few hairs. All these characteristics must be studied and understood, and then there will be but little difficulty representing it. Let the pupil study the arrangement of hair in the old Greek sculptures, and I think with the method of analysis I have pointed out and a careful examination of the arrangement in good models of gem engraving, and he will soon get the correct ideas. A few words on the drapery—cloth is about as hard to represent in gem engraving as human hair. The reader will see it is as impossible to represent the threads (whether fine or coarse) in his work, as it would be in showing individual hairs, consequently, he must deal with the masses, and these masses are folds; and the texture has everything to do with these. Almost every kind of cloth has its characteristic manner of folding; coarse woollen cloth has large round-edged folds; fine soft linen, small crease-like folds, and seldom run in long lines; silk, if of the stiff kind, has large flat folds, with a marked tendency to appear angular. I will treat some of these matters more at length in my next, which will be devoted to cameo cutting.

Self-Winding Watch.

THE annexed engraving represents a device for winding a watch by means of the motion of the wearer's body in walking, which has been patented by A. R. von Loehr, of Vienna, and described in the *Horological Journal*.

It will be observed that the mechanism is in principle the same as that which constitutes the pedometer. The inventor is aware that the motion of a weighted lever has been used before for winding a watch, but he claims to have overcome the objections existing in former arrangements.

A weighted lever, G, is pivoted at one end, and kept in its normal position against the upper of two banking pins, as shown, by the long curved spring. The strength of this spring is so adjusted that the motion of the body in walking is sufficient to cause the lever to descend to the lower banking pin at each step. There is a ratchet-wheel with very fine teeth, pivoted at the same center as the weighted lever, and fixed to the lever is a pawl A, which engages with a ratchet wheel. It is considered a special feature of the invention that this pawl is made very elastic, in order to take up the strain arising from any tendency of the pendulum to vibrate after the mainspring has been fully wound up. A is the barrel arbor, and the connection between it and the



ratchet-wheel is made by means of a train of wheels, as shown; B is a second pawl to prevent the return of the ratchet-wheel.

It is urged that a watch wound in this automatic manner yields a better rate, by reason of the lesser range of mainspring in use, than when wound in the ordinary way.

In connection with this invention is an up and down indicator, with a revolving dial, which does not need special description.

For setting hands there is a disk, B, which has a milled surface, slightly cupped to suit the point of the finger.

Some Gossip About The Trade.

THE average newspaper man is lost in wonder and amazement at the magnificent display of wealth and dazzle and glitter generally to be found in a jewelry store. He likes to write about such unfamiliar things, as they give abundant scope to his lively imagination. Sometimes one of greater intelligence and versatility than the generality of reporters, picks up some gossip that is readable, and tickles the fancy of the public. The following, which we clip from the *Daily Graphic*, is entertaining, if not strictly accurate:

Variety is the spice of life. The adage is old; the application is not, though in some of its bearings it may be more or less dangerous. Some great philosopher of the future may enunciate this same sentiment in some other way, probably in many more words, and be credited with having made a great discovery.

But the merchants on Broadway prove the truth of the saying almost every day. I was looking at the stock of a jewelry store far up Fifth avenue the other day. It is virtually a museum. Bronzes, diamonds, golden toys of every shape and pattern, beautiful molding in China, tapestry pictures, and so much of the taste, the skill, the industry, the imagination, the art of to-day is there as in many another salesman's palace. No museum has such art of display. Nothing jumbled together, the eye not fatigued or confused by the helter-skelter style of pitching things together, plenty of necessary space about each exhibit to well display their proportions. Said one of the proprietors, as we walked about the place: "We are continually changing the arrangement of these articles. People get tired of

finding the same thing always in the same place. The customer who comes in next week and finds that bronze in the rear instead of the front of the store, with a different group about it, views it still with renewed interest. It seems in a measure new to him. And so with everything else. We are continually rearranging the entire stock."

These merchants who, as you may see, are continually changing the order of arrangement in their shop windows, understand practically the application of what our philosopher may call "a great principle dominant in human nature;" to wit, "love of change."

And every man knows how tired he gets of one dish, or of one restaurant, when everything begins to be permeated with a certain subtle monotonous flavor, as if it were all cooked in the same pot, and he looks in vain over the bill of fare for a new relish, and finally goes forth in despair and possibly devours simple bread and butter in a new place with an anaesthetic appetite. And every woman knows how at last the same old bonnet and dress and dress pattern pall, and many other things.

"What are the contents of this case worth?" I asked the jeweler. It was a glass case, perhaps 8 feet in length by 18 inches in width.

"About \$100,000," said he.

"And this tray of rings before us?"

"About \$5,000."

Five thousand dollars in a few circles of metal and glittering stones resting in their soft, satin beds. This \$100,000 would start fifty small retail groceries—perhaps a hundred. This is wealth boiled down. Here were two diamond earrings worth \$5,000 each. Somebody is yet to carry five retail groceries on the lobe of each ear.

It was noon. Most of the salesmen had gone to lunch. Only the proprietor, one clerk and myself were in the store. Before us in these glass cases were gold and gems to the value of half a million—maybe a million. Comparatively few people were passing by.

"See here," said I; "this looks temptations for robbers. What's to prevent three or four strong determined fellows from sauntering in here one by one, and suddenly covering both of you fellows with their pistols, while the confeds scoop in this wealth of Golconda?"

"Because," said the proprietor, "we know them. We have been in this business all our lives. Its part of our business to watch. Thirty years of this life puts a man up to all the devices of the enemy. There are men who come here to steal, men of good address. They have so come in one after the other, and all preserving a strict incognito towards each other. But we know them. We attend them very closely and politely—a clerk to each man. They know what this attention means. They feel it. They appreciate it. They are overpowered by it. They drop out one by one. And we have seen them rejoin each other a little ways down the street."

But even this story could not free my mind from the idea of the possibilities within reach of a small band of bold, bad men in such an open and slenderly guarded array of glass wall'd wealth.

"One trick of the wicked," said the jeweler, "has been very successful among us—that of substituting paste diamonds for the genuine. They ask to select a ring. We place before them a tray. You will observe that each niche is filled by a ring. If one is stolen the vacancy instantly betrays the loss. But when the thief adroitly drops a paste imitation in the niche, after abstracting the real gem, detection is not so easy. Thus we have in past time suffered."

Strange passion—that of the rivalry among wealthy ladies for the possession of the biggest of these pretty stones. The \$10,000 cluster overtops the \$5,000, the \$20,000 combination of glitter lays over the \$10,000, and so on up. And what are they, after all? Stones! Value not intrinsic, but artificial and imaginary. Cast away on a desert, uninhabited island, with a pocketful of these gems and a jack-knife, which would you most value?

But this sort of moralizing from people who can't buy even \$500 diamonds, isn't worth anything. Put yourself in the place of these poor, rich people, live in their world, realize their rivalries, understand the influences dormant or powerful among them, and then see if you wouldn't covet diamonds. The poor are always so virtuous, so

strong in freedom from what they call "petty desires," so very strong—until they get rich.

"Yes," said the proprietor, "a man with money to spend will be sometimes a week making a selection of valuable diamonds. See this pair of \$5,000 fellows? Well, a man comes here almost every day. He's in a dilemma. He wants these and he wants a pair in another establishment. He can't buy both and he can't decide which he will have. I think he lays awake nights over it. He looks like it. He comes here and fingers the gems and sighs and works himself into a fever of indecision, and then goes to the other shop and does the same thing with the same result. Oh, he's getting very miserable over it."

And the diamond merchant laughed a gentle, fiend-like laugh. Such are some of the pleasures of wealth.

But a poorer man may get into the same dreadful state through looking in at the many "merchant tailors'" windows, trying to make up his mind as to the style and pattern of goods he'll have made up for his spring suit, and as he goeth day after day from one window to another he gets worse, and more and more undecided as to the material of that \$35 suit, until at last the very thought makes him sick—physically sick. And maybe he goes and drinks up a fourth or half or even the whole of the cost of the suit out of sheer perplexity and irritation. Oh, yes; such things have been. There's nothing more weakening than to keep making up and unmaking one's mind concerning the same subject. There's another great underlying metaphysical law involved in all this, and the great philosopher of the future is to discover this, and the learned and cultured world will recognize his discovery if he doesn't put it too plainly to them.

How Artificial Pearls are Made.

MANY persons have no doubt been frequently struck with the great beauty of artificial or imitation pearls. Those who make it their business to produce such articles of ornamentation, have attained to a high degree of perfection in their art; so much so that in 1862, at the London Exhibition, a Frenchman who was an adept at their manufacture exhibited a row of large real and imitation pearls alternately; and without close inspection, we are assured, it would have been impossible even for a judge to have selected the real from the unreal. Some translations from French and German works on this manufacture have recently been communicated to *Land and Water*, and from these it appears that the art of making imitation pearls is ascribed to one Jacquin, a chaplet and rosary manufacturer at Passy, who lived about 1680. Noticing that the water after cleaning some whitefish (*Leuciscus alburnus*), a species of dace, was of a silvery appearance, he gradually collected the sediment, and with this substance—to which he gave the name of *essence d'orient*—and with a thin glue made of parchment, he lined the glass bead of which he framed his rosaries, and afterward filled them with wax. The method of making the round bead is by heating one end—which has first been closed—of a glass tube, which then, when blown into two or three times, expands into a globular form. The workman then separates the bead, places the end which has been heated on a wire, and heats the other end. This process is called bordering or edging. The best pearls are made in the same way, the holes of the tubes being gradually reduced by heat to the size of those of the real pearls, the workman taking each bead on inserted wire, and, by continually turning them round in the flame of the lamp used, they become so true as to be struck as evenly as the Oriental pearls.

The process of coloring the pearl is commenced by lining the interior of the ball with a delicate layer of perfectly limpid and colorless parchment glue; and before it is quite dry the essence of orient is introduced by means of a slender glass blowpipe. It is then allowed to dry; the pearl is filled with wax, and if intended for a necklace is pierced through the wax with a redhot needle. The essence or orient, as it is called, is the chief ingredient in the manufacture of

the pearl. It is a very valuable substance, and is obtained from the fish above named by rubbing them rather roughly in a basin of pure water, so as to remove the scale; the whole is then strained through a linen cloth, and left for several days to settle, when the water is drawn off. The sediment forms the essence referred to. It requires from seventeen to eighteen thousand fish to obtain about a pound of this substance! Besides the French imitation pearls, as those above described are called, there are the Roman pearls, which are made of wax, covered with a kind of pearly lustre. But these do not look so well as the French pearls; while, in a heated room, they are apt to stick to the skin. A very extensive trade is now done in the manufacture and sale of French artificial pearls.

The Wisconsin Retail Jewelers' Protective Association.

THE semi-annual session of the above named Association, was held at Milwaukee, February 9, S. B. Boynton, President *pro tem* presiding. There was a large attendance of members from different parts of the state, and representatives from various other associations of jewelers.

W. N. Boynton, President of the U. S. Watchmakers' and Jewelers' Guild made an interesting address, reciting the history of the various state associations and the advantages the trade had derived from these organizations.

The Association decided to send three delegates to the National Association, which meets at Rock Island, May 24th, 1881, and W. H. Thorp, Beaver Dam, Theo. Schelle, Milwaukee, and C. A. Estberg, Waukesha, were duly elected as said delegates.

The matter of discarding the present black list of jobbers who sell to outsiders, was fully discussed, some of the members holding that it would be better to do so, thus showing such jobbers that the Association is disposed to deal honorably with them; but no action was taken, it being generally agreed that the better way would be to stand by the previous action, the jobbers having a knowledge that as soon as they would agree to deal with jewelers only, their names would be stricken from the black list.

A discussion ensued as to devising some means of putting a stop to what was termed the catalogue nuisance, and it was finally requested that the retailers of the state signify to the Secretary whether or not they desire the catalogues discontinued.

The feasibility of uniting on a uniform price list for bench work, as arranged and presented by W. N. Boynton, was debated, but decided against, though generally acknowledged by all present to be a good thing for all interested, provided it would or could be lived up to.

After listening to a few well-chosen remarks by J. W. Cathcart, the Association tendered a vote of thanks to the proprietor of the Kirby House for the free use of their parlors to meet in, selected Madison as the next place to hold the Association, and adjourned, all uniting in the decision that the semi-annual session had been interesting and profitable.

The Pearl Fisheries of Ceylon.

THE banks of Aripo have lately been inspected by Captain Donnan, the master attendant of Colombo, who went to Silavatuai for that purpose. From the report of the fishery proceedings, it seems that there are about three-fifths of the original number of oysters in the beds still remaining to be fished, notwithstanding that the last season was prolonged to the first week in May. With a view to induce a larger number of boats and divers to attend next season, their shares of the oysters fished have been increased by Government proclamation. It is thought that pearls of fine size will be obtained from the oysters remaining on the beds which have yet to be fished. In 1879 the proceeds of the year's pearl fishery were very large, some seven millions of oysters being fished, and the sales realized about £6,000. The returns for 1880 are not as yet available.

Directions for Gold and Silver Plating, used in Horology.

BY HERMANN GROSCH.

Remarks.—The different parts of a watch are gold plated to protect them against oxidation, and at the same time to give all parts an even, harmonizing appearance. Only one style of gilding was known formerly, that of fire-gilding, based upon the avidity of mercury for gold, which was united with it, and the quicksilver was afterward driven off by fire. Partly on account of the poisonous qualities of these vapors, and partly owing to the softening and warming of the metallic parts by the fire, the discovery of the wet or galvanic process of gilding was hailed as a great progress in the art. Fire gilding has almost become a thing of the past, and it is only here and there used at the present day in England.

It often happens that one or the other thing in a watch, has to be made new, or that unskilful hands have used still more unskilful brushes, and have treated divers parts so badly that a healthy eye will then turn sick at beholding the horrible maltreatment; and it is very convenient in such cases to know how to manipulate the process of gold plating. It will, and does happen that an ambitious young horologist will construct his own watch, which he also would desire to gild himself, and the following is written for such an ambitious genius. It demands no great expenses, and offers no great difficulties or obstacles.

Preparation of the Gilding, or the Bath.—Take a $3\frac{1}{2}$ gold piece, or even a \$1.00 piece, according to the surface to be gilded; hammer it flat, pass it through the rollers, or if there are none in the shop, ask a goldsmith to do it; heat it well, to burn all grease from it, and cut it into small pieces. Meanwhile have prepared in a flat porcelain dish, a small portion of *aqua regia*; 3 parts, by weight, of muriatic acid; 2 parts nitric acid—and place it on a sandbath—a small tin box or pan with river sand in it; set it over an alcohol flame, and throw in the small pieces of gold. Do this in the open air, however, because the rising fumes are very bad smelling and strong, and the operator had better tie a cloth steeped in vinegar over mouth and nose, especially when he has to stir this mass from time to time with a glass rod. He had better, moreover, take off his Sunday clothes, and put on a pair of old gloves, the matter flies out at times.

After the gold has completely dissolved keep on boiling the mass to a thickish brown-red residue; remove the plate, let it cool, and thereupon add some distilled water (the addition of spirits or salmiac is not to be recommended, on account of danger of explosion—fulminating gold is formed thereby). The gold thus prepared is called chloride of gold. The operator has meanwhile placed a new earthen vessel, containing 1 to $1\frac{1}{2}$ litres rain or distilled water, on the stove; add 12 grammes of cyanide of potash, and 6 grammes cooking salts which are also stirred until fully dissolved. To this add the chloride of gold, let it boil about $\frac{1}{4}$ hour, stirring it at times, take off and let cool. Pass this mixture through a paper filter in a glass funnel, and bottle; cork well, and the gold bath is ready.

Remarks.—Attention is called to the poisonous qualities of chloride of gold, but especially to the exceedingly poisonous nature of the cyanide of potash, and great care has to be taken in handling this mixture.

Preparation of the Silver Bath, or the Silvering.—Either dissolve the silver, as per direction for the gold, in *aqua regia*, or in nitric acid, drive it off until it is thick; or buy either lunar caustic or nitrate of silver in a drug store, (poisons, also), dissolve in water, and add cyanide of potash dissolved in water. To 5 grams silver is added 1 to $1\frac{1}{2}$ litres water, and 8 to 10 grams cyanide of potash. Filter and preserve in bottles.

Preparation of the Silver Powder.—Nitrate of silver is dissolved in a glass or porcelain vessel, in diluted water—2 grams to about 1 litre of water. When well dissolved, add a small handful of cooking salt, stir it at times, and let it stand for 10 or 12 hours. A thick, white substance will be found at the bottom of the vessel—chloride of sil-

ver—decant the water carefully, add fresh water, stir it, and let it settle for several hours; again decant, add fresh water, and add per 1 litre, 30 grams of sulphuric acid. Then insert several strips of zinc plate, in the fluid, stir from time to time; an ebullition will take place, and the white powder will assume a dark tinge; all will be ready within a couple of hours, let it settle, wash and dry on unsized paper, and you have pure metallic silver, in the finest dust, which may be preserved in a well-stoppered glass bottle.

Preparation of the Parts for Gilding.—If the parts, as is mostly the case, are of brass or German silver, grind them well, first with water stone, follow with linden coal and water, to remove all previous scratches or marks, and finish with a brush and finely washed tripoli. Pin the articles upon cork plates, in such a manner that the upper side remains up; put small pieces of cork in the spaces between them; put pins in the screw holes, which add to the great security. The more articles requiring to be grained, the greater the success, the better the graining. The work under treatment must never be handled with naked fingers; use a pair of tweezers or pin-cers.

Graining Powder.—To 1 part of dry silver powder, add 6 parts finely pulverized and sifted cooking salt, and 3 parts of cream tartar, rule together in a mortar with a pestle, until well mixed, and add water to a thick batter.

Application of the Graining.—By means of a pretty hard brush dipped in water, take off this dough and belabor the fastened articles in all directions. It must be either a new brush, or one well washed, so as not to contain any grease whatsoever. Keep on for about one minute, if you desire to obtain a nice grain; by brushing less time, you obtain a fine, by brushing longer, you obtain a coarse graining; but by continuing too long, it will become very uneven—full of depths and ridges, and the only remedy to overcome it is by grinding down and repeating the operation. If you are satisfied with the result, brush with a brass wire brush, of the finest wire, (and herein lies your success), which has been unwound for about 3 centimetres, and rub this from time to time on the rubbing iron, with a boiling of soap root, over the silvering, as well to produce a good adherence of the silvering as to impart a lustre to the dead grain.

Some operators use a mixture of common salt, cream of tartar, and nitrate of silver, to insure the adherence of the silvering, but the writer has never been able to see the reason for the operation. After wire brushing, rinse the parts repeatedly with clean cold water; take them off without touching them with the fingers, however, and let them lie in clean water up to the time that they are put in the gilding.

The Gilding.—The parts have thus been silvered and lie in clean water; take them out and put them in the gold bath. To prepare this, take the bottle of gilding fluid; pour a small quantity into a porcelain cup or saucer, proportioned to the size and quantity of articles to be gilded; have a strip of zinc plate well scraped down to the metal, of the breadth of a finger, on hand, bend it, and insert it in the gilding fluid in the cup, bent end down, the two ends resting upward on the rim of the cup. Lay the article upon it, of course, with the main sides upward; bridges or wheels suspend from it by small brass hooks. The saucer or cup is now seated on a sand bath over an alcohol flame; new articles need less heat (35° to 40° K.); old ones some what more. You will see in a short time how the articles change color, and you may take out one in about 2 minutes, to see how thick the deposit of gold is; brush it with a brass wire brush, especially reserved for the purpose, treating it in all respects as has been given for the silvering one. Brush with a boiling of soap root, or if not on hand, beer or wine will do as well. Rinse in clean water, and re-immense in the fluid; then brush again. Repeat this operation corresponding to the thickness of the coating which the article is intended to receive. If the articles remain too long in the fluid, they are apt to become spotted with dark red spots, and demand a greatly increased work with the wire brush.

(To be continued.)

Workshop Notes.

We intend hereafter to give in this department practical recipes culled from English, German, French, Spanish, Italian and other foreign exchanges. Since the metric system is in vogue on the Continent, we subjoin calculated tables for the same:

MEASURES OF CAPACITY.			
No. Liters.		Dry Measure.	
Liter..... equals.....	1..... equals.....	0.908 quart..... equals.....	1.0667 quarts.
Deciliter..... ".....	10..... equals.....	3.381 cubic in.....	8.454 gill.
Centiliter..... ".....	100..... equals.....	0.0162 cubic in.....	0.262 fluid oz.
Milliliter..... ".....	1000..... equals.....	0.001 cubic in.....	0.037 fluid oz.
Name.		Weight of what quantity of water at maximum density.	
Gram..... equals.....	1 cubic centimeter..... equals.....	15.432 grs.	Avoirdupois weight.
Decigram..... ".....	1 cubic centimeter.....	1.5432 grs.	
Centigram..... ".....	1 cubic centimeter.....	0.1543 gr.	
Milligram..... ".....	1 cubic millimeter.....	0.00154 gr.	
STANDARD WEIGHTS OF UNITED STATES COINS.			
Double Eagle, 100 gold.....	314	Half Dollar, silver.....	119.9
Eagle, 10 ".....	125	Quarter Dollar, silver.....	62.5
Half Eagle, 5 ".....	125	Twenty Cents, ".....	17.16
Quarter Eagle, 25 ".....	62.5	One Cent, ".....	28.35
Three Dollars, ".....	17.4	Five Cents, copper-nickel.....	17.16
One Dollar, ".....	27.0	Two Cents, ".....	17.16
Trade Dollar, silver.....	480	One Cent, bronze.....	48
One Dollar, ".....	412.5	U. S. gold and silver coins are 9-16 fine.	

To color brass black, immerse it in a solution of aqua regia and platinum. This will produce the desired result quicker than anything else.

Varnish to give brass a gold color: Seedlac, 180 grains, melted amber, 60 grains; Gamboge gum, 6 grains; extract of red sandal wood, 1 gram; dragon's blood, 35 grains; saffron, 2 grains; powdered glass, 120 grains; alcohol, 1,000 grains.

Files, whose cut is good yet, sometimes refuse to take hold, being doughed up with filing dust. Lay them in diluted pearl ash, dry them in a stove, and brush them with a stiff brush. A solution of potash or soda in water serves the same purpose.

To oxidize silver ware, immerse them in a solution of sulphur and potash. The surface becomes coated with a coat of sulphate of silver, of slate-gray color. The brown color on silver it produced by immersing it in a solution of salmiac and sulphate of copper (blue vitriol).

Boring holes in hard steel may be done by means of nitric acid. Cover the steel plate on the place where the perforation is to take place with a thick layer of molten wax. When cold, make a hole in the wax of the size required, and put a few drops of strong nitric acid into it. Add until the plate is perforated.

The *Comptes Rendus* contain the recipe of a new alloy, made by Mr. Matthey, of London. Its specific weight at freezing point is 21.6, and it is composed of platinum, 80.660; iridium, 17.097; rhodium, 0.122; iron, 0.008; ruthenium, 0.046. This alloy is so malleable and elastic that Sainte Claire Deville possesses a wire of it only a few hundredth millimetres in thickness and barely visible.

Brown color for iron and steel.—Dissolve 2 parts crystallized chloride of iron, 2 parts chloride of antimony, and 1 part tarric acid in 4 parts water. Use a sponge or cloth to anoint the article with, and let it dry in the sun. Repeat the operation, according to depth of color desired. Then wash with water and at last rub the article with boiled linseed oil. The chloride of antimony should be as little acid as possible.

Dr. Burger publishes the following recipe for a rapid silvering of brass or copper articles: Mix 2 parts of chloride of silver, 20 parts of finely powdered cream of tartar, and 15 parts powdered cooking salt. Add water sufficient, stir to a batter and rub this on the surface of the article with blotting paper. Having anointed all parts of the article well with this preparation, rub off with a rag and powdered chalk; then wash off and wipe with a soft cloth.

Mr. Fleitmann has discovered the means to make nickel malleable, even in its cold state. He adds $\frac{1}{2}$ per cent. metallic magnesium through a hole in the cover of the crucible. He treated cobalt the same way, and found that it is very hard, when cold, but malleable in its heated state. It is supposed to nickel in whiteness and lustre. He has welded these metals to iron and steel, and thus rolled them out into plate of the finest numbers.

To remove the gold from old watch cases, articles of jewelry, &c., cover them with a batter of a mixture of 2 parts sulphur and 1 part salmiac, dissolved in vinegar. Heat on a charcoal fire, and cool in water to which a little sulphuric acid has been added. Leave it immersed for several hours; then take out and brush it with a soft wire brush, when the gold can be removed in flakes. Filter the water, wash the remaining gold to free it from the acid, dry, add equal parts of finely powdered borax and saltpetre, and melt it with the filter.

Foreign Gossip.

Handsome silver jewelry is becoming as fashionable as gold.

Mrs. Leopold de Rothschild has a new necklace which, although it is only a single row of pearls, is valued at \$100,000. One of her husband's bridal gifts was a pleasant little sum of \$2,500 for distribution among the Jewish charities at Vienna.

In scientific circles it is reported that the Astronomer Royal is about to retire from his present post. Mr. Proctor and Mr. Piazzi Smyth, of Edinburgh, are mentioned in connection with the prospective vacancy.

It is said French ladies are adopting the fashion of wearing diamonds on all occasions, and the wives of American editors can now sport their diamond necklaces and solitaires at Saratoga hotel breakfast tables next season without exciting remark. The editors' club will be reserved for poets as usual.

A recent fire in Beaumont, France, destroyed the extensive factory of Jappy & Freres, the largest manufacturers of watch blanks in the world. Over 2,000 workmen were thus thrown out of employment. As a consequence, watch blanks have advanced from 25 to 30 per cent. in price, and the smaller manufacturers of Switzerland are over-run with orders.

The Cross of the Legion of Honor is counted especially honorable when worn by a tradesman in France. A legionary who goes through the Bankruptcy Court ceases *ipso facto* to belong to the order. To be decorated is to be sure of credit. Merchants therefore strive hard to obtain the decoration, which must not be paraded in advertisements, or on trade circulars or cards.

England is being flooded with what are now called New York sovereigns. These are counterfeit coins made in America so perfectly as to have deceived the English experts for some time. They have exactly the same weight and diameter and give the proper ring, but are a little thicker than the true coin, which defect was only discovered when they were put up in rouleaux.

In consequence of the number of imitation Waltham watches thrown upon the English market by unscrupulous manufacturers, the American Watch Company announce that they will prosecute to the utmost extent under the Trade Marks Registration Act, 1875, any firm or individual offering for sale as Waltham watches imitations thereof, or using the name of the American Watch Company or their trade marks to designate goods not of the manufacture of the American Watch Company.

At the last Paris exhibition considerable attention was drawn to some muslin curtains to which a flame was constantly applied without setting them on fire. The chemical composition of the substance which rendered them incombustible, as recently made known, was 80 parts pure sulphate of ammonia, 25 of carbonate of ammonia, 30 of boric acid, 12 of pure borax, 20 of starch, and 1,000 of distilled or pure water. The materials to be rendered fire resisting are dipped into this solution while it is hot, so as to insure thorough impregnation, and, when well dried, are ironed as ordinary starched fabrics.

The Goldsmiths' Company, London, are apparently doubly convinced of the importance of technical education to Great Britain, judging from their late action. They have passed a resolution increasing their subscription to the City and Guilds of London Institute for the promotion of technical education from £2,000 to £4,000 per annum, the increase to commence from the 1st of last January. Besides this they have promised a gift of £10,000 toward the building fund for the erection on Exhibition road, South Kensington, of a central Institute.

Four bronze statues, which have recently been found at Pompeii, are now to be seen in Naples. One is a magnificent work about two feet high, representing a cupid holding a dolphin on his right shoulder, the head of which he grasps with his left hand. This figure was found on a pedestal at the side of the entrance to the peristyle of a newly excavated house, and was a fountain. From the mouth of the dolphin water fell into a beautiful marble vase placed on a marble column. In a niche on the right of the atrium of the same house were found three other bronze statues. The one in the middle was placed on a square base. It represents the Goddess of Abundance, having in her right hand a silver plate, in the left a cornucopia full of fruits and flowers. It is draped with a long tunic with short sleeves and a mantle, and is seated on a cushioned chair with magnificently ornamented arms, each of which is supported by the extremity. The feet of the goddess are sandalled, and rest on a footstool decorated with two sphinxes. The two lateral statues represent two lari, each with a tyron in the right and a plate in the left hand.

Trade Gossip.

Roman pearls are now worn for evening.

Delicately carved ivory fans are in favor.

The newest lace pin is a half opened fan with its sticks jeweled. Diamond flies and ruby tortoiseshells are among the attractive new pieces of jewelry.

A new ornament for the watch chain is a gold pencil in the shape of a miniature obelisk.

The latest scarf pin is a candlestick containing a white enamel candle with a diamond flame.

Scarf pins representing a boy kicking a foot ball, the ball being a large pearl, is a novel idea.

E. S. and W. S. Fowler have recently established themselves in the optical business in Chicago.

Precious stones are always fashionable, so it is advisable to have as little fancy jewelry as possible.

The famous pink pearls of Queen Isabella are now worn by the bride of Prince Rudolph, of Austria.

William Henderson, Jr., for many years with Leonard Decker, has made an engagement with J. F. Angell.

Bracelets and necklaces are composed of old silver and gold coins; each piece is joined by a small double silver chain.

J. F. Jeanneret, a watchmaker doing business at 66 Nassau street, was recently robbed of some \$1,200 worth of watches.

Seal rings and pendants are set with Jasper, lapis lazuli, jade, sard, peridot, moss agate, topaz, bloodstone and sardonyx.

A Bowery shop-keeper exhibits a solid silver image of the first horse-car run in New Orleans. It was a "botbait."

Bracelets take every shape and style, from the slender, plain Etruscan bangle to the richest designs in bands and serpents.

Bracelets and necklaces are more worn than ever, as the former are positively necessary with elbow sleeves and long gloves.

Albert J. Lewis, for several years with George C. Shreve & Co., San Francisco, has been admitted to membership in the firm.

Dyer Brainard, of the firm of Brainard & Steele, is the happy sire of a promising young candidate for the Jewelers' League.

Henry Untermyer and Samuel Aufhauser, for several years with Keller & Untermyer, have been admitted to membership in the firm.

Garside & Berdan's jewelry store at Paterson, N. J., was recently entered by burglars and robbed of some \$6,000 worth of watches and jewelry.

A patriotic timepiece displayed in Broadway contains representations of the Declaration of Independence and of Lincoln's emancipation of slaves.

One of the latest fancies in scarf pins is a street gas lamp with the door swung open, a small diamond representing the light. It is very effective and quite pretty.

A great quantity of enamel jewelry is in vogue. Some of these articles are in designs of flowers and birds on dead gold groundings, and others are all enamel.

E. T. Baker, formerly with Wm. Fisher & Co., has made an engagement with the Derby Silver Plate Company, and has started on his usual western trip in their interest.

Alfred Krower, for many years in the employ of Albert Lorsch, whose house is so well and favorably known throughout the trade, has been given an interest in the business.

Col. J. M. Rutherford, the well known jewelry auctioneer, has been closing out the stock of H. W. Rugg, of Bradford, Pa., who announces his positive retirement from business.

C. F. Huntington, of St. Albans, Vt., has bought out the stock of E. H. Huntington, and will continue to present to his customers all the attractive novelties to be found in the jewelry trade.

Novel ornamental applications of jet with the name of "jet mosaics" are about to afflict the public eye. It was hoped the day of jet jewelry was passed and gone forever, but here it comes again!

J. F. Saunders, of the firm of Saunders & Ives, is expected to sail for Europe early in March, and will visit the prominent diamond marts of the old world in search of goods for the coming season.

The firm of Hart & Sloan, manufacturers of tools, etc., has been dissolved by mutual consent, Mr. Hart retiring. The business will hereafter be conducted under the firm name of C. T. Sloan & Co.

Mr. James Hedges, of the firm of William S. Hedges & Co., will sail for Europe in the steamer *Galatia*, March 2. He will visit the diamond marts of the old world in search of new goods for his house.

Mr. J. Eugene Robert, watch importer, has received an invoice from his correspondents abroad, of chronograph watches, which are attracting considerable attention on account of their excellence and cheapness.

All manner of semi-precious stones are set in rings, mostly solitaire, such as the blue topaz from the diamond mines of Africa, garnets from Arizona, the cool, glittering aquamarine and the flame-color Swiss topaz.

J. Holland, a gold pen manufacturer of Cincinnati, claims to have discovered a process for fusing iridium, and that it can be cast into superior burners for the electric light which will not require the use of glass globes.

Many necklaces are in chain shape, and are fastened against the waist by means of a ball or any other kind of brooch. Watch chains can be well employed for this purpose. They can also be made into bracelets without being cut.

Gypsy rings are less massive than those of the same style worn by men. They are plain gold rounded bands; the stones, a ruby, a cat's-eye, sapphire or diamond, are embedded in the gold showing only the surface cut en cabochon (without facets).

The firm of Champier and Wathier, watchmakers of Chicago, has been dissolved by mutual consent, Mr. Champier retiring. J. P. Wathier will continue the business with increased facilities at No. 61 Kenzie street, the old quarters of the late firm.

In artistic jewelry, beetles, cockroaches and spiders are the favorites of the latter especially. It is made of gold, silver, diamonds and every kind of precious stones, and used as eardrums, brooches, charms and ornaments for millinery.

Mr. Joseph Stern, of Mayer & Stern, sailed for Europe Feb. 24, in the steamer *Freia*. This is the first time in twenty years that he has visited his native land, having led a busy life in this country, and been so engrossed in business that he could not be spared.

To leave his watch with a jeweler for repairs, to call for it several times and be put off each time, and finally, on demanding it, to be informed that the watch had been given for rent to the jeweler's landlord, was the novel experience of a man in Fordham recently.

Smashing the plate glass windows of jewelry stores, and seizing goods exhibited therein, has been a favorite trick of thieves in this city lately. Charles McCormack, of No. 1,423 Broadway, is the latest victim. His loss, however, was slight, and the thieves escaped.

The New York Jewelers' Base Ball Club has just received from the Providence Club, an elaborate set of resolutions, elegantly engrossed and framed, in recognition of the splendid manner in which they were entertained by the New Yorkers on their visit to this city in July last.

The taste for tiny animals in diamonds continues; cats, spiders, owls and snails are all worn in brilliants. A wealthy Parisian lady recently appeared in a white beaver bonnet which had on it a white dove with eyes and a necklace of diamonds, and the strings were fastened with a small dove made of diamonds.

There seems to be no end to the devices in silver jewelry, most of which are exceedingly pretty and are growing in popular favor. L. A. Cuppia introduces many attractive features in this line of goods, entirely novel and peculiarly his own. An elastic bracelet in silver and gold, the latter patented, is attracting much attention.

A heavy, square lump of lead weighing nearly ten pounds, known as the head of a burglar's "dumb hammer," was recently thrown through a large plate glass window in the jewelry shop of A. Newburger, at No. 531 Sixth avenue, and nearly \$5,000 worth of diamonds were stolen. The thieves, as usual, were not arrested.

Isadore Weil, a traveler in the employ of Leopold Weil & Co., had his trunk broken open and robbed of a case of samples while stopping at Willard's Hotel, Washington. The thieves were evidently surprised at work, for they left the most valuable goods in the trunk. The traveler has been ordered home where he will have an opportunity to explain matters.

It has been finally determined that brass is more than a match for electricity. A Connecticut clock pedler who was struck on the cheek by a thunderbolt cannot allude to the circumstance without a profound feeling of pity for the poor bolt. He says it gave him a pretty good idea of the origin of the saying that lightning never strikes twice in the same place.

There is a decided change taking place in bracelets. Heretofore they have been worn on the bare arm and on the glove, since long gloves have been in fashion; but now they are put on over the sleeves of dresses, and are large and massive. They fasten the sleeve tightly at the wrist, and have all sorts of objects attached to them—ancient coins, quadrupeds and charms of all sorts.

Trade Gossip.

Mr. George Rockwell, the courteous auditor of the Meriden Britannia Company, has surrendered to the charms of Miss Minnie Battles, who now holds him a willing captive in the camp of the Benedict. We congratulate our friend on the manner of his captivity, and trust he may have many pleasant reminders of the auspicious event.

A recent dispatch from Melbourne, Australia, to Robbins & Appleton, announces that the American watches have taken the first prize at the great exhibition. In fact they were the only individual exhibitors who were awarded a first prize. The American Watch Company now has so many first prizes taken at international exhibitions, that it is almost impossible to keep the run of them.

Wm. P. Gough, for several years bookkeeper for Carter, Howkins & Co., will take Mr. Hastings' position as traveler for the house. Mr. Gough has grown up in the establishment, is thoroughly familiar with the goods made by the firm, and is well qualified to take the place of the "old traveler," who now retires on his well-won laurels to enjoy the more quiet repose afforded by a life in the office.

A jeweler in New Jersey had a sun glass exposed in his show window, and during the recent warm days the sun shone brightly in, warming up the glass, which finally set fire to the window. Happily the fire was extinguished with but little damage, whereupon our Teutonic friend exclaimed, "dot was a good ding dot glass don't go off in de night, wen nobody was here to put it out, ain't it?"

Why shouldn't we call an International Congress and revise the time of day? We are revising the Bible by a Committee of Nations, and next to the Bible time is the most precious thing we all have in common. There is no more reason why we should have 12 o'clock twice a day than there is to repeat the years in a century. "A. M." and "P. M." are awkward and unnecessary, and "23 o'clock" is as easy to say as "11 P. M."

The firm of Buckenham, Cole & Saunders has been dissolved by mutual consent. Mr. E. G. Buckenham, head of the old firm, will continue in the business. Mr. Cole retires, and Mr. Saunders has formed a co-partnership with Mr. Chauncey Ives, for the purpose of conducting a diamond business, and has opened an office at No. 26 Maiden Lane, under the firm name of Saunders & Ives. Mr. Buckenham's new business home has not yet been made known.

An eccentric watchmaker living in Maine professes to have cured one of his children of a malady that defied the skill of the doctors, by passing her over a mule's back three times every morning for nine days. The case is a very remarkable one, and all the more so because the mule is supposed to carry its pharmacopoeia in its hind legs instead of its back. Persons who receive the mule treatment in the usual way seldom know what it is to be sick again, particularly if the mule is strong and healthy.

An exquisite lace pin of artistic workmanship has a ground of heavy filagree on which designs of fruits and flowers are applied in brilliant enameling. Another represents a piece of fine lace formed of small diamonds gracefully twisted into a bow and fastened with a pearl-headed pin. Others are made of hammered gold with artistic devices incrustated in small precious stones, or set with cats-eyes, rubies, sapphires, or the semi-precious stones, such as moonstone, hyacinth, peridot, tourmaline or Labrador spar.

The election of Mr. R. H. Galbreath, of the firm of Duhme & Co., as President of the Cincinnati Exposition Commissioners, is not only a compliment to that gentleman, but it is an evidence of the discrimination of the members of the commission. During all the years Mr. Galbreath has served as a Commissioner he has proved himself most efficient. To him is due the praise for the skillful and attractive arrangement of the displays in the last Exposition. As President he will have enlarged duties, and his ability is equal to the demand. The Exposition of 1881 has an auspicious beginning.

Watch chains are quite out of fashion for ladies; even chateauxes are not worn unless they are antique. It is in better taste to conceal the watch altogether, as it is no longer considered an article of jewelry. A watch, however pretty it may be, is an article for use; it is consequently fastened to the waist on a black moire antique ribbon, and either worn in a pocket or slit, in the body of the dress. This fashion also applies in a great extent to lockets. The latter, however, continue to be worn, as all who are possessed of handsome articles of this kind will certainly not lay them aside, but they are not as extensively purchased as they have been.

A Providence firm, that makes a specialty of cheap jewelry for prize packages, turned out the following pieces last year: Rings, 3,055,000; collar buttons, 1,451,000; cuff buttons, 715,000; ladies' pins, 307,000; drops, 400,000; scarf pins, 523,000; scarf rings, 199,000; tail pins, 268,000; studs, 2,463,000; ear wires, 603,000; bib pins, 95,000; crosses, 152,000; charms, 80,000; bracelets, 59,000; hair pins, 140,000; badges, 640,000. Separate and distinct pieces, 19,700,000; cards used in carding, 1,700,000.

In the case of Joseph Lederer, of Chicago, who failure has been heretofore announced, Mr. D. Safford, representing eastern creditors, whose claims aggregate \$92,000, caused the arrest of Mr. Lederer, in five actions of assumpsit. The affidavits set forth that Lederer sent his bookkeeper out of the city a few days before the fire; that after the fire the stock and assets, which should be \$100,000, were only \$32,000; that Lederer's only explanation was that the firemen and citizens stole his goods; that Lederer has been known to transfer at least \$10,000 worth of goods to friends and relatives, and to sell an equal amount to other jewelers. Many other charges are brought, showing Lederer's dishonest purpose and tendency to establish his guilt. He was held in \$1,000 bail, which he gave without delay. Lederer was arrested a second time, and was bailed by the father of his attorney. Other charges will be pressed against him as rapidly as possible.

Messrs. M. W. Galt, Bro. & Co., of Washington, have on exhibition a magnificent silver punch-bowl presented to the wife of Senator J. E. McDonald by his brother Senators. The bowl is of solid sterling silver, 15 inches high and the same in diameter. The top is enriched with a heavy beading of classic pattern, the handles being composed of Bacchus heads crowned with grapes, executed in gold. The base is also heavily enriched with gold beading, and the vase of the bowl is gold lined. The ladle is designed in harmony with the style of the bowl, the top of the handle bearing an infant Bacchus reclining in a shell, clasping an overturned amphora, and overshadowed by pendant grape leaves and bunches of grapes all executed in gold. One side of the bowl bears the inscription: "Mrs. Joseph E. McDonald. A wedding gift from the brother Senators of Joseph E. McDonald, Jan. 1, 1881." On the other side are the names of the 73 Senators who took part in the presentation, beginning with the Hon. H. B. Anthony, and ending with the Hon. A. S. Paddock. A handsome rosewood box, lined with maroon velvet, forms the case for this beautiful gift.

Some scarf pins for gentlemen are especially unique, and some of the most novel and elaborate specimens are inexpensive, as a sheep of white enamel, having exquisitely curled fleece; the earth represented in a flat, satin-finished gold surface, set with a moonstone. Another has a diamond Mars, Venus, and a comet with a finely engraved tail. On a golden bar is perched a tiny owl, of artistically carved moonstone, with ruby eyes. Some different specimens of Pompeian glass, irregularly shaped, are set in yellow gold. On the point of a silver crescent is perched an owl of porphyry from Pompeii; on a little gold ladder of Etruscan work an enameled frog climbs toward a moonstone set in a flat gold surface. Other scarf pins are set with dogs' heads with diamond eyes, gold engraved pigs, sprawling frogs elegantly enameled, bats of copper-gold, tiger's claws, and a great variety of devices for the professions, such as palettes and musical instruments. There are classic designs, as antique coins, masks, busts, and vases. There are games, as polo, tennis, cricket, yachting. Some of these are executed in hammered gold, rich with curious and precious stones; the hammered horseshoe has nails of rubies, sapphires and diamonds.

One of the best known jewelers in Omaha relates the following story of a young man who came to negotiate a delicate business: It was nothing less than the selling of an engagement ring which, as the ex-customer said, he "had no further use for." He was reticent about the previous facts in the case, but finally, under pressure, gave himself away, as the victim to the funniest kind of absent-mindedness. The confession was that he was coasting on a traverse some nights ago with the girl whom he was engaged to marry, and with two or three other parties, the girl having the last seat on the traverse, as she was timid, and he sitting in front of her. When they reached the foot of the hill and got off the sled to draw it up, one of the other boys exclaimed, "Why! where's K—?" (the young lady). He looked around and she was nowhere. "What a stunning baw he found her scrambling out of the snow, half chilled and indignantly refused his offer to take her home, but insisted on going to the parental roof unaccompanied; and when he ventured to call the next night and inquire after her health, K—'s mother met the young man at the door and handed him the ring in a bit of paper and explained that her daughter "didn't care to be tied up to a man who could lose her off a traverse and not know it."

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THE

JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

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Growth of the Jewelry Trade.

YEAR by year the jewelry trade is growing in commercial importance. A few years ago, comparatively speaking, what jewelry was made was for the adornment of royalty, or men and women of wealth and high degree. Now it has become a necessity, almost, and there is scarcely a man or woman to be found who does not wear some article of jewelry, either for ornament or practical use. Where, in olden times, the jeweler's art was expended mostly in making settings for precious stones to decorate the persons of the nobility, now, in these utilitarian days, his skill and ingenuity have wrought the precious metals into such practical shapes and forms that it has become almost impossible for a person of either sex to dress without calling into play some article of jewelry. It is because of these practical uses to which jewelry is put that the jewelry trade has achieved such great importance as one of our standard industries, consuming about one-third of the precious metals produced, and giving employment to hundreds of thousands of persons. No other industry has so great a diversity of products as the jewelry trade, nor of such varied value, nor is there one where skilled labor can produce such artistic results. In the products of the jewelry trade is exhibited, in a more pronounced manner than anywhere else, the value of labor, for it is a common thing to find designs in gold and silver where the labor expended upon them is worth many times the intrinsic value of the metal used. With the increasing demand for jewelry of all kinds the trade has multiplied itself, and become so extended that in every place of one thousand inhabitants there will be found two or three jewelers, keeping small stocks of goods and prosecuting the business of watch repairing as an adjunct to the sale of jewelry. Every large city boasts of many elegant establishments devoted to the jewelry traffic, and members of the guild are almost as numerous and as necessary as dry goods merchants. We have been astonished to find how many jewelers there are who, following the march of civilization, have established themselves in

frontier towns that were unheard of five or ten years ago, and who are doing a good and profitable business. Of course, a considerable portion of their income is derived from watch repairing, but as every one now carries a watch, the watch repairer is a necessity wherever civilization is found.

These small dealers are too often overlooked by the manufacturers and jobbers, who do not seem to feel that their trade is worth seeking. But every one of these carries from \$100 to \$5,000 worth of stock, and as they are numbered by the thousands, the aggregate of their purchases makes a very handsome sum each year. Their money, what there is of it, is as good as that of the dealers whose purchases run up into the thousands annually, and is well worth looking after. These frontier jewelers are the sturdy pioneers who are carrying art into the wilderness, where it readily takes root and brings forth good fruit. It is but about thirty years since Chicago was a detached frog pond, connected with Lake Michigan by slimy grasses and canals of mud; to-day it is the art center whence millions of people draw their artistic inspirations and furnishes a market for the sale of jewelry second only to New York. The west is full of cities whose development has been even more sudden, and whose prospects for future growth are better than were those of Chicago twenty years ago. During the next decade the greater part of the development of the resources of this country will be made in the region lying west of the Mississippi river, and wherever a hamlet or a city springs up, there will be found a market for jewelry.

As the country increases in population and wealth, the demand for better grades of jewelry increases proportionately. With education and culture, attendant upon wealth, come a refined taste, and the cheap and gaudy decorations that please the fancy of the ignorant and vulgar, are superseded by artistic jewelry, beautiful in design, finished in workmanship, and rich in intrinsic value. The demand for this class of goods has been steadily on the increase, and manufacturers are pushed to secure the necessary skilled labor to produce the designs and workmanship required. Not only has this demand extended to articles of personal adornment, but rich plate and articles of virtu are now required that the markets of Europe alone could afford a few years since. But our manufacturers have been equal to the emergency, producing in their own factories works of classic and modern designs that the best gold and silver workers of the old country might envy. At the recent world's industrial exhibitions our manufacturers have taken first rank among the producers of art treasures in wrought gold and silver. But while a refined taste naturally demands the jewelers' best work, it is nevertheless within the province of the trade to aid materially the cultivation of this taste for their best productions. It is only by constant looking upon good pictures that one comes to appreciate good painting, and to long for such works of art as satisfy a cultivated taste. So with artistic works in wrought gold and silver; the public must become familiar with them before it will appreciate and buy them. Retail dealers can do good missionary work in this direction by keeping in view artistic examples of the handiwork of their craft, and educating the public to know and value the difference between rare workmanship and the "cheap and nasty" jewelry so called, that, like Hodge's razors, is made to sell, possessing neither merit of work-

manship nor intrinsic value of metal. They should strive at all times to instruct their customers to distinguish between goods that are valuable for all time and those which have nothing to recommend them but a gaudy exterior. While there are many manufacturers who are honestly seeking to exalt the guild to which they belong, striving with all their means to excel in their artistic productions, there are others, to whom the present almighty dollar is worth more than the future of their calling, and who are constantly seeking to degrade it, by manufacturing spurious goods and imitations in base metal of their neighbors' better productions. If the retail dealers would discriminate between these classes, and refuse to handle the baser goods, they would confer a blessing upon the public and in the end find their own profit in so doing. There is, of course, a legitimate demand for certain kinds of cheap jewelry, but when this is sold on its merits as such, and no deception attempted by either the manufacturer or dealer, comparatively little harm is done; it is when the spurious is palmed off as the genuine that the damage is accomplished, the public being led to look with suspicion upon all kinds of goods and to question the integrity of the trade in general. The jewelers' art is one of the noblest of all industries, its productions soaring into the regions of high art, and, at the same time, satisfying the most radical utilitarian. It should be preserved from the ravaging hands of the conscienceless speculators, who have no scruples to overcome nor reputations to injure. The retail trade can do much to expel from its ranks the few men of this stamp who hang upon its skirts, and, as the business grows and expands; educate the people to a better appreciation of that which is genuine in quality, artistic in its nature and excellent in its workmanship.

The Present Condition of Trade.

SOME disappointment is expressed by manufacturers and jobbers because the Spring trade, that was expected to begin early this year, is still delayed. If they would stop to consider for a moment, they would readily find a satisfactory reason for this delay. In the first place, we have had a remarkably severe winter, extending not only over all the Northern States, but giving to the extreme south such a touch of frost as had not been known for many years. All through the country there has been an embargo of snow, ice, rain, or mud laid upon travel. In the west, there have been terrible snow storms, blockading the railroads and the country roads alike; further south there have been repeated heavy rain falls, flooding vast areas of country, and rendering all roads impassable from the depth of mud. Farmers have been unable to market their produce, and hence have been prevented from buying liberally. In New York the condition of our streets has subjected the street cleaning bureau to much abuse, but one who has not absolutely experienced it cannot realize the depth of mud that prolonged rains can make on the dirt roads in the country. A week of such rain made it impossible at one time, for General Burnside to move the Army of the Potomac. The attempt was made, but before five miles had been accomplished, men, horses, and mules were floundering in a sea of mud, provisions, and ammunition were spoiled, and a promising campaign ended in disaster. If an army was thus blockaded, with every facility and every motive for moving promptly, what can be expected of ordinary citizens under similar conditions having neither facilities for travel nor powerful impelling motive. Such have been the conditions this winter all over that great region lying south of the Ohio River. Even the travelers in the trade, men noted for their enterprise and push, have been obliged to abandon their routes because of the impassable roads, and leave their customers unvisited and unsolicited. North of the Ohio, a similar embargo has been laid on travel by the huge drifts of snow, many feet high, which effectually confined the farmers to their homes. Urgent business alone furnished an excuse for attempting to visit town, or for going from one place to another.

As a consequence of this severe weather, the retail jewelers, who had stocked themselves up liberally at holiday time with goods for

the winter's traffic, find at this time their stocks undisposed of, and trade remarkably dull. They are hopeful, however, and are confident that as soon as the roads have settled after the Spring rains, they will have a good trade, all the more active for having been delayed. While the snow, the intense cold and the heavy rains have served to make trade stagnant during the Winter, the universal testimony is that just this condition of things was necessary to insure good crops this coming season. Last fall there was a prolonged drought, extending into the Winter, drying up the streams, and making a general scarcity of water. The heavy snow and rain fall was, therefore, necessary to restore to the parched earth the moisture necessary for the cultivation of crops. So, while the severe Winter has been disagreeable in some respects, it has, without doubt, been a blessing in disguise, the full benefits of which we shall reap in the bountiful crops of the coming season.

Another thing that has tended, as it always does, to discourage trade, was the unsettled condition of affairs immediately following a Presidential election. This Winter matters were especially unsettled while Congress was debating over the three per cent. funding bill, the general feeling being that the passage of the measure would unsettle the stock market, lead to a general depreciation of values, and to another panic, similar to that of 1873. The banks took the alarm early, and began calling in their circulation, and, for a few days, there was really quite a panic in the stock market. Whatever might have been the effect of the passage of the funding bill, certain it is that the change it proposed in the rate of interest caused alarm, that grew as the debates were prolonged, and it was not until President Hayes vetoed the measure that business men breathed more freely. All this, together with the prospective changes in the control of the national finances incident to a change of administration, tended to unsettle business, and to make buyers cautious in their purchases. But all this has passed, President Garfield is duly installed in office, and has surrounded himself with Cabinet officers of acknowledged ability and character, who have already the machinery of government well in hand. The tone, too, of the new President's early utterances were of a nature to give confidence to all sections, and especially to bring the North and the South into more intimate relations. Indeed, there are many indications that the strong sectional feeling that has existed since the war is rapidly disappearing, and that in the immediate future we shall regain a large portion of the Southern trade that was destroyed when secession "loosed the dogs of war." A remarkable illustration of this growing sentiment of national unity was afforded by the grand ovation given last month in New Orleans to visiting regiments of New York and Massachusetts militia. But a few years ago these regiments were engaged in deadly strife with those who were now their hosts, but the intervening years have so softened their enmity that now they meet in brotherly concord and vie with each other in showering courtesies upon each other's heads. Nothing so tends to overcome the hostility and prejudices of men as social intercourse, and as the men of the South and the North are becoming more social and intimate there is and will be less friction. So, with the returning era of good fellowship and good faith between the sections hitherto divided, the intimate business relations they once held to each other are sure to be renewed. Indeed, this growth of good feeling is already being felt, and more goods of various kinds have been sold to southern merchants this Winter than in any other season for twenty years. Unfortunately, the roads have been so bad that it has been almost impossible to move goods from the railway stations, and at many points the warehouses are filled with merchandise *en route* to southern merchants. In a few instances, goods have been so long delayed *in transit* that they have been returned, the advent of Spring making the Winter orders out of date.

While the Spring trade has been delayed for the causes named, and others, there is every reason to believe that it is only deferred, not lost. The prospects are also good for an excellent trade throughout the season. The country generally is prosperous, money is plenty, and the trade at large, not overstocked with goods. As in-

timated above, some of the retail dealers have been unable to work off all their holiday purchases, but the jobbers as a rule are not over-loaded with goods. When the country is freed from mud and snow so that the retail trade has a little more activity infused into it, their demands will soon consume the stocks on hand, and there will be a cry for more goods. Notwithstanding the present dullness, we congratulate the trade on a bright outlook for the future.

Advertising Frauds.

EVERY little while some one in the trade comes to complain to us of the manner in which he has been swindled by some audacious canvasser of some preposterous publication. All sorts of schemes are devised by these rapacious adventurers to delude the public, from pretentious weekly papers to the hackneyed annual calendar, all of which are made simply to exhibit advertisements and not for general circulation. For instance, a calendar issued at the beginning of the year, was to have advertisers' cards liberally displayed, and a large distribution of them was promised by the vulture canvasser. Some of the members of the trade bit at this tempting bait, only to find that they had been bitten, for the canvasser had taken orders for twice the number of cards the calendar had room for. A few would be printed with each advertiser's card on especially to exhibit to them, but such cards were removed as soon as the price agreed upon had been collected, to make room for others. The trade was also badly sold by a pamphlet alleged to have been issued by responsible parties well known to the trade, and was to be liberally circulated among dealers throughout the country as well as at all the hotels. As a matter of fact the book was not issued by the parties alleged, but was a scheme got up by some clever adventurer, and the circulation limited to those who advertised in it.

The jewelry trade is regarded as a promising field for advertising adventurers to cultivate, and scarcely a day passes that they are not solicited to bestow their patronage upon some publication regarding which they know nothing. Judicious advertising is indispensable to business success, but indiscriminate advertising is a waste of money. There are certain mediums for advertising that no prudent man will overlook, but these consist of publications of known circulation and established reputations. The ephemeral class to which we refer, whose circulation exists in the imagination of their projectors, and whose influence is an unknown quantity, are not deserving of patronage. They are like the street beggars, the more you give to them the greater the number that will swarm about you.

The daily papers and the well known magazines are legitimate mediums for business men to use to advise the public of the nature of their business and the lines of goods they carry. But these were found not to wholly supply the wants of business, and hence there have, of late years, sprung up a class of specialty papers devoted exclusively to the interests of some particular trade or line of business. The conductors of these papers devote their time and expend large amounts in cultivating the special field upon which they have entered. They strive to make themselves a medium of communication between the producers and their customers. They neither expect nor are they entitled to the patronage of the general public. Working within circumscribed limits, and constantly pushing in one direction, their sole object being the welfare of the industry to which they are devoted, the conductors of such special papers are in a position to be of the greatest service to their patrons. THE JEWELERS' CIRCULAR is a fair sample of this class of papers. During its twelve years of existence it has never sought patronage outside of the jewelry trade. It would be of no use whatever for hardware men to advertise in its columns, and other outsiders could not get in if they wanted to. But we have made every effort to place THE CIRCULAR in the hands of every retail dealer in the country, and thus bring them in direct communication with the manufacturers and jobbers. By making a paper that would interest all classes in the trade, we have sought to make it of value to all. As a consequence

we have a circulation within the trade that no other journal can hope to rival. We have made it our business to so build it into the trade that it would be indispensable, and our success has been most gratifying, as we are honored with a list of subscribers second to that of no other special paper in the country. We care nothing for the outside public, and will neither accept their advertisements or sell them THE CIRCULAR. What THE CIRCULAR is to the jewelry trade other specialty papers are to the callings they represent, are legitimate enterprises, and as such are entitled to support. But for that ephemeral class of publications to which we have alluded we have nothing but contempt. They are not legitimate in any sense, and are only started to put a few dollars in the pockets of their projectors. As the Spring approaches all sorts of advertising traps are being sprung upon the public, and the jewelry trade will be, as usual, importuned for advertising. We warn the trade against throwing away their money on such schemes, that have neither reputable godfathers nor godmothers. Advertise liberally, for in no other way can you spend money to better advantage, but patronize only those publications whose established reputations are guarantees of legitimate circulation, and whose utterances are deserving of confidence. In this way only can you get value received. Avoid the itinerant canvasser, who has no reputation to make or lose, as you would a sneak thief seeking opportunity to rob you surreptitiously.

An Important Case.

A CASE of considerable importance was brought before the courts in Philadelphia wherein two jewelers and an engraver were charged with counterfeiting the trade mark of the American and Elgin Watch Companies. S. C. and E. S. Bartlett, jewelers, and William Phoenix are the persons accused. They are charged by Ezra C. Fitch, of the American Watch Company, and Lucius I. Wooley, of the Elgin Company, with purchasing cheap watch movements and engraving thereon the trade-marks of the respective companies, and selling the watches as genuine American or Elgin watches. There were several witnesses in the case, two of whom purchased the bogus watches, and Messrs. Fitch and Wooley testified that the watches so bought were not of their manufacture, although bearing their trade-mark. A detective who had been working up the case against the accused testified to admissions made to him by Phoenix, going to show that he was aiding the Bartletts in this "crooked" work. The trade-mark of the American Company that was counterfeited was "P. S. Bartlett, Waltham, Mass., Patent Pinion," this being one of the grades of fine watches made by the company, but the counterfeiters had placed it upon movements worth about \$3.00. The Elgin mark that was counterfeited was "B. W. Raymond." At the conclusion of the preliminary examination the accused were held to answer in \$1,500 each. It is not believed that the accused had put many of these bogus watches on the market as they were selling to individuals singly as opportunity presented. As their profit was large it is highly probable that their operations would have soon been extended had they not been detected.

A Necklace of American Gems.

WE were recently favored by Dr. Hamlin, of Bangor, Me., with a view of the famous necklace worn by Mrs. Hamlin at the Inauguration ball in Washington. Dr. Hamlin is a well known collector of precious stones found in this country, as his father was before him. The necklace is composed entirely of American jewels, and represents the research of sixty years. In it are precious stones of almost every kind, the examples in the necklace being the finest specimens that could be found, beautifully cut, and of the most brilliant lustre. Placed beside a necklace formed of stones of other countries, the American products suffer none in the comparison. This is the most extensive and valuable collection of purely American jewels in existence, and should be in the possession of the gov-

ernment. We shall, at an early day, present our readers with an illustration of this famous necklace, together with a description of the various stones composing it, Dr. Hamlin having kindly consented to furnish a photograph of it, and the material to prepare a history of the jewels. The collection is remarkable, both because of its intrinsic value and of the fact that the stones were all found in this country. Dr. Hamlin is confident that as the country is developed, America will be able to supply herself with all the precious stones required for home consumption, and, possibly, have a surplus for exportation.

The Jewelers' League.

We devote this column to the interests of the League and its membership. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will be herein answered. Address *Jewelers' League, Box 4001, P. O. New York*, or the office of *THE CIRCULAR*.

We have frequent inquiries from various parts of the country as to the proper course to be pursued by members of the trade who desire to join the League, but who do not know any member as such to recommend them. The report of the proceedings at the last annual meeting, together with the full roll of the members, will be out in pamphlet form in a few days, and will be sent to anyone who requires them. From this roll may be learned the names of members who are commercial travelers and with some of whom those desirous of joining are doubtless acquainted. Or, again, if it is only intimated to one or two travelers that Mr. A. will buy a fair sized bill of the first member of the League who comes along, the news will pass from mouth to mouth until Mr. A. will have accomplished the double purpose of buying some very desirable goods and finding a gentleman who has thereby become well enough acquainted with him to recommend him.

At the regular meeting of the Executive Committee, held on the 4th of March, the following named candidates were elected to membership:

New York City—James M. Bennett, Max Freund, Meyer Isenberg, George N. Joyce, Moses Kahn, John A. Linherr, Philip Maucher, Augustus Mayers, Moritz Moses, Henry Oehl, Jacob Stern, Jacob Strauss, Leopold Weil, William Winter. Brooklyn, N. Y.—Samuel Hahn, Henry Van Winkle. Yonkers, N. Y.—Lucius N. Woolley. Syracuse, N. Y.—William R. Frier, David Wood. Attleboro, Mass.—John H. Baker. Mansfield, Mass.—Leonard W. Sweet. Providence, R. I.—William C. Donle. Newark, N. J.—William A. Cobb, James H. Powell, Francis Holt, Franklin Day. Philadelphia, Pa.—William G. Blair, George A. Bernard, Albert W. Grimley, Oliver M. Hamrick, George T. Seal. Lancaster, Pa.—August Bischoff. Baltimore, Md.—August H. Overbeck, Jr. Vicksburg, Miss.—Will Voellinger, Jr. Seguin, Texas—Herman Krezdorn. Mt. Vernon, Ohio—Freeman F. Ward. Lafayette, Ind.—Charles H. Ankeny. Quincy, Ill.—David G. Anderson. Ludington, Mich.—William G. Cushman. St. Louis, Mo.—Frederick Baehr. Mason City, Iowa—Charles E. Mann. Ashland, Neb.—Julius R. Watts. Washington, D. C.—Edward J. Lewis.

The member from Lafayette, Indiana is the pioneer from that great State—the first member of the League from Indiana. The remainder of the State should blush for its inaction.

There were 43 members accepted at that meeting, 2 candidates were rejected and 6 were laid over for further consideration, making the total membership 1,140. Amount in the General Fund, \$2,004.57; amount in the Benefit Fund, \$2,166.95. But one member was dropped from the roll for non-payment of the last assessment.

The life insurance interest in this State has at last fairly shown its hand in the inauguration of open handed legislation against all mutual benefit associations. Early in March a bill was offered in the Assembly of the State of New York by James W. Husted, proposing to make each charitable, benevolent and aid society comply with the same laws which were enacted to keep the regular life insurance companies honest in their business. Mr. Husted and his

bill, however, find themselves confronted by the combined action of 300,000 members of benevolent societies in this State who have, for a year or more, been preparing for this onslaught, and who are making themselves heard and felt. The League is ably represented in, and its interests will be carefully watched by, a union formed for that specific purpose, and in which are represented societies aggregating over 30,000 men.

Hiddenite, or Lithia Emerald.

WE have heretofore mentioned the fact that Mr. W. E. Hidden, while engaged in explorations in North Carolina, had discovered a fissure vein carrying emeralds. Dr. J. L. Smith examined specimens sent him, and in a paper which he prepared upon them describes them as "an emerald green variety of spodumene." The crystals were found sparingly at first, but by perseverance Mr. Hidden located their source in a fissure of the rock, and having obtained possession of the property is now prosecuting scientific mining for them. A tunnel is being cut through the solid rock, which will be about 250 feet in length before it strikes the vein at the required depth. The vein is very thin, being only 2 to $2\frac{1}{2}$ inches in thickness, by about 2 feet in lateral extent. After subjecting the specimens to the usual tests, Dr. Smith pronounced it to be a new variety of spodumene, and proposed for it the name of Hiddenite, by which it will be known to scientists. The color of the Hiddenite, always transparent, ranges from rare specimens that are colorless to a deep emerald green, some of the fragments having a uniform green color, but are usually more intensely green at the extremities. The largest crystal yet found is $2\frac{1}{4}$ inches in length, but very thin; the average is about one half an inch long by three-sixteenths of an inch in width. The prismatic cleavage is remarkably perfect, yielding surfaces of the highest lustre. Its hardness exceeds that of the emerald, and its specific gravity varies from 3.189 to 3.194. Some of the specimens obtained by Mr. Hidden have been cut, the result being very handsome stones that found ready purchasers among dealers in precious stones, some having been sold for over \$100 a karat.

Mr. George F. Kunz, with Tiffany & Co., one of the best known stone experts in the trade, recently read a paper before the Academy of Sciences on this new gem, to which he assigns a high place:

"When Dr. J. Lawrence Smith wrote his paper on Hiddenite he embraced in it all the facts then developed. His announcement was written full two months prior to its publication and it was in this short interval, and also from subsequent work at the locality, that the points I have to add in this paper have been developed by Mr. Wm. E. Hidden. The mistake of calling this mineral diopside was a very excusable one, as spodumene had never before been found unaltered and transparent, and consequently it resembled nothing so much as diopside, which latter mineral is always transparent and green. Spodumene is also closely isomorphous with diopside, differing only a fraction of a degree in the prismatic angle of its crystals, and like it also in its cleavage in two directions. The true character of this new variety of spodumene was only discovered when an attempt was made to find the cause of its beautiful color. Hiddenite, or Lithia-Emerald, is to the species spodumene precisely what emerald is to the species beryl, a transparent dark green variety. The species beryl as a mineral is more common than spodumene; both are found in large crystals, usually opaque or with only a trace of color. It is strange, in fact remarkably, that the species spodumene, which has been to mineralogists a most unsatisfactory mineral, should at last develop into a gem stone.

Its color is one peculiar to itself, differing from the beryl emerald in its vividness or in a quality of color that I might better term hiddenite. I know of nothing that I can better liken the color of this new gem to than the beautiful effect produced by falling bits of uranite in water. It is a green of great splendor.

It might be asked why this new mineral has been so readily accepted as a gem of the finest rank. I would answer that it possesses all the characteristics that are considered essential in a gem stone, i. e., perfection of color, hardness, transparency and rarity. Only a limited number of these gems have thus far been found, scarcely more than enough to establish its character. As regards value, it has been sold for over one hundred dollars per karat to the whole-

sale gem dealers. As yet the only dependence for these gems is the narrow vein (2½ inches thick and 2 feet in lateral extent), found by Mr. Hidden in Alexander County, North Carolina.

The lapidaries find the stone harder across the ends than across the sides. Its name in the gem mart is lithia-erald. It was named from the presence of over seven per cent. of lithia, an alkali wholly absent in the beryl emerald.

It is strange that this mineral should have been discovered while in search of the beryl emerald, and we now have our first example of a purely American transparent gem."

Criticism of Mr. Muller's Chronometer Escapement.

WE published in our December number an extract from the *British Horological Journal*, describing a so-called new chronometer escapement of Mr. Muller. The *Deutsche Uhrmacher Zeitung*, Berlin, Feb. 15, contains the following criticism upon it, by Mr. Jules Grossman: The model sent me for inspection of Mr. Muller's Normal Chronometer movement came to hand, and I am free to pronounce it an emanation of the well-known escapement of constant power, (*force constante*), and cannot, therefore call it an invention, but simply a modification. All these escapements demand an excess of motor power, because when at their minimum, that is, when the watch is nearly run down, or when, by lapse of years, the oil has become thickened, there must still be power sufficiently stored up to propel the balance spring which furnishes the impulse, with a full amount of live force. These escapements demand an exact and careful execution, and have, with regard to their rate, until now, not rendered services equivalent to their construction.

Mr. Muller much errs with regard to the compensation; by far the greater part of the deviation is caused by the temperature, which produces an elasticity of the balance spring. If this elasticity were to remain equal at all times, and a heightened temperature were only to affect the length, breadth and thickness of the spring, and the balance were to expand equally in radius, the result would be a gain in the rate of the watch, contrary to experiments which show that it will with a steel balance, lose ten seconds in twenty-four hours, for each one centigrade of rise of temperature. But the decreased or increased impulse can only exert its influence upon the extent of the balance vibrations, not upon their duration. If a balance could be constructed inextensible by temperature, it would only lessen the above determined rate of ten seconds by one second, and a rate difference of nine seconds still remains to be compensated.

In the next instance, the uniform extent of the balance vibrations caused by a motor of equal power, and which imparts the impulse to the balance, is not at all times the same, because other causes combine to disturb it, the friction of the balance pivots among them.

The pivot friction of a watch in a vertical position is greater than in a horizontal one. In this latter position the friction with flat polished pivots is only two-thirds as great as in the other. But flat polished pivots are condemned at present by regulators, who give the preference to well-rounded ones, and in their case the friction does not amount to one-third in laying as it does in hanging.

Mr. Muller next treats of isochronism of the balance-spring, and reproduces the exploded fallacy as being due to its length. Exact experiments have demonstrated the falsity of this doctrine.

The theory of the balance-spring and the balance vibrations, which has made such progress lately, but, alas, can only be satisfactorily proven by help of mathematics, states as a fundamental law, that the length of the balance spring can exert no influence whatever upon the duration of the greater or lesser vibrations, when the spring complies with certain conditions, as indicated by Mr. Ed. Phillips. It might be tersely expressed in watchmakers' language, "the balance spring works well when it is well-mounted." But to do this of course, a spring moulder is necessary who understands his business.

Too short a spring cannot work true; too long a one is objectionable on account of its trembling, and a short one would soon become "lame." The duration of vibrations is further influenced by a faulty escapement, and the smaller vibrations commonly consume more

time than the greater; again, the centrifugal power of compensated balances exerts itself in an inverse manner; this exertion increases with the size of the balance, and is, consequently, of moment in a marine chronometer.

I will not deny that the mechanism of Mr. Muller appears attractive at first glance to the horologist, but when examined carefully great defects will be found, for example, the very significant radius of the cylindrical repose. The cuts in the *Journal* indicated this much. I could not investigate it in the model sent me for inspection, because the taking it into pieces was prohibited. Its anchor is apt to bank against the staff-roll, and finally, the great angle of movement of the fork is against all theories of regularity.

I hope these random remarks will serve as my opinion of the wonderful movement of this so-called "Normal Chronometer Escapement."

Trap for the Unwary.

OF the invention of new wiles for the unwary, and for the especial amusement of the rural population, there is no end in enterprising Gotham. The latest and one of the most barefaced of the swindles, although not particularly neat, is reported to have been very successful. It is carried on principally by the "fakirs" about country fairs, taverns and other places where rustic betting men are most likely to be found. Two qualities are only necessary to success, and these are the two always found in the wandering swindler, city or country—plenty of cheek and the ability to emigrate without delay in an emergency.

The stock in trade is a bogus watch, such as are now made in great quantities by the notion manufacturers. They make a gilt stem-winding watch which has a solid look about it and readily deceives the uninitiated, which they can sell to the jobbers and wholesalers for 92 cents by the gross. It has a spring and a pair of wheels set at a sixty-minute to the hour gait, and which will run for half an hour or so, just long enough, in fact, to enable the swindler to leave town or get conveniently out of sight. The stem has a ratchet attachment, which makes a sound on winding up much like the genuine article, and the main wheel has a straight spring ratchet, which, as the wheel revolves, gives out a tick, tick of the right sort. The whole thing is got up with an aristocratic air and is as good looking as it is rascally, especially when attached to a ten-cent fire gilt chain which won't tarnish within twenty-four hours after being exposed to the air, but whose ultimate destiny makes it so extremely *verá antique* that the verdegis sticks to one's fingers.

These untimely pieces are sold by the jobbers to the "fakirs" at \$1.20 apiece, and the patent soap and liver-pad man seldom leaves the city without making a \$5 investment in them, for he doesn't hide them in a napkin or under a bushel, but, judiciously handled, they bring him back his own many fold.

The "fakir" it may be incidentally explained, is the gentleman with a little hand bag and a folding stand, who during the winter haunts Broadway corners for short periods, and who is constantly haunted in turn by ghosts of the Broadway Squad. In the summer he prefers to get out of the city where people are apt to know too much and he takes kindly to any irregular and rascally industry from three-card monte and thimble rigging to corn plasters, the lightning calculator and bogus soap packages, containing mythical greenbacks. He is greatly given to country fairs and rural racing tracks. He changes his abiding place frequently and rapidly and is the nearest resemblance in a human way to the traditional flea. For \$1.25 he can get five pounds of soap suitable for his purpose, which, cut in cubes and wrapped in tissue paper, completes his stock with the aid of two or three stray counterfeit bills or ex-lager beer keg stamps, or anything else that looks like a greenback. Or, in an emergency, half a dozen new bronze cents (1881) may answer for quarter eagles. A little legerdemain and a ready tongue do the rest.

The enterprising young man from Gotham generally manages, by glib talk and one-quarter second glimpses of supposititious greenbacks

to get rid of his 25 cents a pound soap at a rate of 25 cents an inch, at about the time when the racing begins. Leaving his tripod and handbag behind a convenient door or under a convenient floor, he makes his way to the spot where the betting men are congregated and proceeds to take a great interest in the coming races. He gets enthusiastic on the favorite—always the favorite—learns the odds and picks out a convenient greenhorn. The greener the rustic, the more likely he is to "know all about it." The odds are, say, \$100 to \$80 on the favorite. The Gothamite in his enthusiasm offers \$100 to \$50, and half a dozen smart gawks offer to take him up at once. They are even anxious to show the stranger from the city that they know a thing or two, and that he is not as smart as he would like to have them think. His game is to work up every time. The minute the rustic has got himself to thinking he has "caught a flat" he is lost and Gotham knows it only too well. He gets out a big roll of bills, a judicious mixture of greenbacks and counterfeiters, the many small ones being genuine and the few big ones bogus, and finds, to his chagrin, of course, that he has only \$85. "Well," he says, "I'll put this up against your \$50." The country man is too smart for that and insists on the original terms, rather sneering at the greenness of the city man who doesn't apparently comprehend what is due from one sporting man to another. Gotham does not neglect to become immediately nettled. His pride is touched. He pockets his money and goes down in his vest for his tucker. "Here," he says, "is my chronometer; gave \$150 for it six months ago. Up she goes." If country expresses any doubt upon the subject, out comes a receipt, "Tiffany & Co., New York," all regular, for Gotham is never caught napping, and country accepts the situation. Moral—If the favorite loses Gotham is out \$1.20; if it wins he is in \$50. In taking off the ten-cent chain which is not in the bet, the fakir dexterously winds the watch, for its guaranteed thirty minutes, and whatever the result of the race the rural betting man is taken in, and Gotham has time to catch his train before the discovery is made.

The Chicago Jewelry Robbery.

OUR readers will remember that some time ago we published an account of a bold theft of jewelry at Chicago. Mr. Morrow, traveling salesman for Ernest Thoma, while taking his departure from the Clifton House had his baggage sent to the sidewalk to be loaded on the baggage wagon. In an instant his sample trunk was missing. It contained about \$6,000 worth of jewelry. Detectives were at once placed on the alert, and William R. Alling, President of the Jewelers' Protective Union, notified. Pinkerton, the well known detective, who is in the employ of the Union, was instructed to capture the thieves and recover the goods, if possible, but in all events to hunt down the thieves. As a result of his efforts a portion of the goods were recovered in a few days, and a pawnbroker named Isaacs and Walter McDonald, a Chicago City official and a detective named Aldrich, employed in the Union Bank, were arrested. The two persons last named were the ones who returned a portion of the goods to Mr. Morrow. They were indicted but have not yet been brought to trial. Subsequent information led to the recovery of Mr. Morrow's trunk, laden with stones, from the bottom of the river, where it had been sunk by the thieves. But the thieves themselves were still at large, with which condition of things neither Mr. Alling nor Mr. Pinkerton were satisfied. They quietly pursued their investigations, and on March 4th they succeeded in arresting four men named Nick and Mike Bauer, Matt Asch and a man named Schroeder. Confessions made by the accused not only show them to have been guilty of the theft of Morrow's trunk, but to constitute a portion of a regular gang of law-breakers, who prosecute burglary and common thievery as opportunity presents. It appears that one of the thieves seized the trunk in front of the hotel and ran with it. He was soon joined by one of the others, and the two carried it by a circuitous route to a saloon kept by Bauer, the other two thieves following to prevent pursuit. At the saloon the trunk was rifled of

the jewelry, and then sunk in the river. The pawnbroker Isaacs offered them \$500 for the goods, and finally gave them \$300 for that portion which Aldrich and McDonald restored to Morrow, under agreement that Morrow was to pay them liberally. The evidence seems to be complete to send the entire gang to State prison, and this result is due to the persistency with which Mr. Alling has directed the pursuit. He would be satisfied with nothing less than the capture of the thieves, and Mr. Pinkerton cheerfully co-operated with him, rendering such effective detective service in the case that the whole country should be grateful to him. The final arrests were made by Chicago officers, but the credit of bringing this dangerous gang of burglars to justice is due to the Jewelers' Protective Union and its able detective, Mr. Pinkerton. In every case where members of the Union have been robbed, the thieves have been brought to punishment and most of the goods recovered.

Since the above was written Aldrich has been tried, convicted and sentenced to State's prison for eighteen months. Bauer turned State's evidence and "gave away" the whole gang. The prosecution of Isaacs follows next month.

Re-Silvering Brass Clock Dials.

THE following solutions are generally employed for electro-plating: Silver solution, No. 1: cyanide of potassium, $\frac{1}{4}$ lb.; cyanide of silver, $1\frac{1}{2}$ oz.; water, 1 gallon. The cyanide of potassium, in the form of white cakes or lumps, is dissolved in the water, and allowed to settle; it is then filtered. The cyanide of silver, a white powder, is then gradually added to the alkaline cyanide solution in the above proportions; it will dissolve on stirring, and the result is the electro-plating solution desired. It contains 1 oz. of silver to the gallon. Solution No. 2: This is the solution of silver which is most easily prepared; it is also the cheapest, and there is neither time nor labor spent in preparing the silver salt for solution in the cyanide solution. The materials employed are: Cyanide of potassium, $\frac{1}{4}$ lb.; water, 1 gallon. This solution is placed in a large vessel, and a similar solution is placed in a flat porous vessel, which is supported in the larger vessel, so that the liquid is the same height in each vessel. In the porous vessel is put a small and clean piece of iron, and in the outer vessel a large and thick sheet of pure silver, the iron being so fixed that the conductor in contact with it does not enter the solution, and the silver being supported entirely in the liquid by means of thick silver wire. When these details are properly arranged, the silver plate and the iron plate are so connected with the source of electric power that the electric current proceeds from the silver to the iron. The size of the silver plate may be half a square foot, and the electric power employed may be equivalent to six Smee's cells, each with an area of 18 square inches. In a few hours the silver plate will have lost 1 oz. of the metal. The disposition of metal on the cathode is prevented by the use of the porous vessel. The liquid in the porous vessel may contain some silver; this may be ascertained by the addition thereto of muriatic acid. Although there is free caustic potash in the solution, which by contact with the air becomes carbonate of potash, and although the resulting solution is not quite so conductive of electricity as No. 1, it is a very good solution in practice, and is said to be less likely to deposit non-adherent metal, or in technical terms, metal "that will strip," than many others.—Alexander Hay, *technical and analytical chemist.*

THE *Schw. Uhrmacherstg.*, not the HOROLOGICAL REVIEW, tells the following story: One morning a manufacturer came into his storeroom and heard an unusual noise; man, woman and child in his employ were set to work to find out the cause, and the compound sagacity of the multitude diagnosed that the clocks, watches, etc., had commenced ticking on their own responsibility, for their amusement, despairing of their chances to ever do it for anybody else. Several managed to remove the dust from off them. "One hand washes the other, and both the face," you know.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Eighty-second Discussion.—Communicated by the Secretary.

(*Notes.*—Correspondents should write all letters intended for the club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. Write only on one side of the paper, state the points briefly, mail as early as possible, as it must be received here not later than the eighth day of the month in order to be discussed and reported in the CIRCULAR for the next month.)

CYANIDE OF POTASSIUM FOR CLEANING WATCHES.

Secretary of Horological Club:

I have a watchmaker and jeweler of about thirty years' experience who uses a solution of cyanide of potassium for cleaning watches, jewelry, silver plated-ware, etc.

I have had but little experience compared with my jeweler, so do not like to dictate. Yet I think the solution injures everything that is cleaned with it. Please give me your opinion of this method of cleaning. I will be glad to remit the postage to any of your readers who will give me their experience with it. B. J. W.

Mr. Electrode said that cyanide of potassium should certainly not be used in cleaning watches, as its effect is to dissolve off the gilding, and we all know that that is never any too thick. It first dissolves all the gold, making the parts look white. It then dissolves off this white or silver coat, leaving the naked brass, of which the movement is made. Besides destroying the gilding, it rusts the steel parts of the watch if the slightest particle of the solution is left in any hole or crack. Even the vapor from it will rust steel chains, tools, etc., on the bench, and also the steel parts of any watches whose cases are left open. He would not allow it on his watch-bench at all, in his own shop, and advised Mr. W. to follow his example. As for using it to clean jewelry, plated-ware, etc., it was often employed for that purpose, but must be used with great caution, as if it was left on an article too long it would dissolve the gold or silver-plating entirely off. All articles cleaned with it should be afterwards thoroughly washed with soap and warm water, and finally soaked in clean hot water, to remove the last vestiges of cyanide, for if even a smell of it remained trouble would follow. Altogether, it was a troublesome substance to deal with, and he had long ago forbidden its use for anything but electro-plating purposes, and adopted aqua ammonia in its place. This was equally powerful and efficacious, would not rust steel, and best of all it could be entirely evaporated and driven off by simple exposure to plenty of air. Finally, he would recommend Mr. W. to be master in his own shop; and, if he saw anything done which he considered injurious, he ought to inquire into it and ascertain whether it really was so or not. If it was, or if it could not be told whether it was or not, he should stop it. He was responsible for any injury done to goods in his shop, and should not allow any practices which could reasonably be considered injurious, no matter how great the experience of the workman.

ELECTRIC ENGINE TO RUN AN AMERICAN LATHE.—HOW TO POLISH AMERICAN END-STONE SETTINGS.

Secretary of Horological Club:

Can any of your honorable body inform me if there is an electric engine in the market suitable for running a No. 2 American lathe? Also, will some one give me the *modus operandi* for polishing American end-stone settings, as they do at the factory? What kind of laps they use, and how to make them, or the place to buy them? I have been waiting in hopes some one would ask the question, and thereby save exposing my ignorance. But I find so many more simple than this that I will not wait longer. I can polish them passably well, but do not feel satisfied if they do not look as well as the best.

E. B. T.

Mr. O'Leary said that there were no such engines in the market, so far as he was aware, which could be safely recommended for use in a watchmaker's shop. There were engines which could be run as a sort of toy or curiosity, but there was nothing suitable for practical working. They were more bother than profit.

As to polishing the end-stone settings, he believed they were not polished at all, but were cut, in the lathe, with a specially prepared graver, whose cutting edge was so finely finished as to have a highly

polished surface direct from the graver. The inner surfaces of the sinks around the pole jewels were cut in the same way,—this graver being kept for the finishing cut for such articles.

ADVICE TO AN APPRENTICE—WHO SHOULD BE A WATCHMAKER?

Secretary of Horological Club:

I have a few grievances, and want some advice from your honorable body. Was in the trade two years; got burned out; could not get a situation; went to Fargo, Dakota. Last September I received a telegram to come back to my native town and finish my trade. Being anxious to finish, I came; had been here but a few months before employer died; the business was sold to new men in the business. Now, the watchmaker is a surly, treacherous fellow, and I have never been allowed to even look at a watch since I came here. The new men are all square, but don't know anything about the customs of the trade, and don't want to force me upon the journeymen, and still want me to work as an apprentice. I feel I am throwing away time, and that I am becoming more of a botch every day, with no one to instruct me. What would you do? Leave the trade, or try and get a place under a good man? Is it possible to get such a place, and how?

Hoping to see at least a short notice in your next, I am, yours sincerely,

APPRENTICE.

Mr. Regulator replied that the decision must rest with Apprentice himself. If he felt that he had special aptitude for watch work, and a strong liking for it, as well as fitness, he had better stick to the trade. But if he felt that he had no very special mechanical genius, nor any special liking for the trade except because it is "a nice business," he should strongly advise him to leave it at once. No young man should ever undertake to become a watchmaker unless he had perfect confidence that he could be a first-rate workman, and a determination to be that and nothing else. The trade is already overburdened with indifferent workmen, and every new man who joins that crowd not only makes it worse for the rest of them, but he is getting into a very poor site for himself, also. A man can scarcely find a more limited sphere of activity, or be a more insignificant member of the business world, than by being a mere watch "tinker." If he has mechanical genius, a liking for fine or small work, a well-settled disposition and *habit* of doing everything nicely and perfectly, inexhaustible patience, good eye-sight and health, he may be a watchmaker. Even if he has no instructor at all, he will always do his work well—as well as he possibly can—will seize every opportunity to learn about his business, will be always experimenting and trying, learning and practicing, and improving. But if he is not such a man as described, if he is of indolent disposition, indisposed to work any more than obliged to, hasty and impatient, likes to get through a job in the quickest and easiest way, even if it is not quite so nice, is disposed to slur over his work and be satisfied with an imperfect job,—in fact, is slovenly and indifferent about his work, he should certainly *not* be a watchmaker. Whether a man with that nature would succeed in any kind of business is problematical, but he would stand a better chance in almost any business than watch repairing, which requires not only exceptional mechanical talent and fitness, but also an exceptional combination of personal qualities, in order to be even a really good workman. If Apprentice decides to continue at the trade he should of course get under good instructions somewhere, as soon as possible. Life is too short to waste in studying out a trade for one's self, and it cannot be done by any ordinary man in this trade. Proper instructions will give him the benefit of the results of the accumulated experiences of thousands of his predecessors, every one of them as good a man as himself, and perhaps far superior. How to obtain such an instruction is for each learner to determine. He must search till he finds one. If Apprentice is correct in his estimate of the "jour," it would probably do him very little good for the proprietors to insist upon the "jour" instructing him. They have the right to insist upon it, but the "jour" can impart as much or little instruction as he pleases. On the other hand, he has the right to set the apprentice to doing such quality of work as he thinks best, no matter how coarse or rough. He is held accountable for the good performance of the watches

repaired at the shop, and, very naturally, he would do all the particular work himself. But as soon as Apprentice showed himself painstaking, careful, and perfect in what he was set to do he would be set at something better. He might depend upon it that the "jour" would be glad to have him do all that he was competent to do perfectly, but he would not be trusted with such work till the "jour" felt sure he could depend on its being done properly. It is for Apprentice to go to work and *prove* what he can do, first. His advancement is in his own hands. He must remember that he is, for the present, the "smallest toad in the puddle," and he will always remain so unless he advances himself by *his own efforts*. He must try, and work, and persevere, resolve to do his work well, and *do it so, every time*. Then, if he is not advanced gradually, but is kept at the same rough work, it would be advisable to find some other place to work. But in all probability the "jour" will advance him as rapidly as he shows himself competent to do something better.

CUTTING A WORM SCREW FOR A MUSICAL BOX.

Secretary of Horological Club:

Will some member of your honorable club please inform me how to cut the screw of the fly wheel or balance of a music box, and oblige
G. F.

Mr. McFuzee thought that probable Mr. F. meant the worm screw which revolves the fly. If he was an extra good workman and had a wheel-cutting engine, he could cut the screw by arranging a suitable cutter at the proper angle with the block, and feeding the latter along at the proper speed. But it would be much cheaper and better to send the old screw to some musical box maker in this city to get a new one, if that was the only part which needed repairing. Also send the wheel, which gears into the screw, if the box was not of ordinary construction, or not made by the parties selected to repair it. He will find names in the advertising columns of CIRCULAR.

JOHNSON'S RIVET EXTRACTOR.

Secretary of Horological Club:

I send you by mail a sample of my rivet extractor, for use on brooch and locket joints, and it is often handy in watch repairing. I have used one for a year, and find it is perfect for the purpose intended. If it will not take out a rivet nothing will but a drill. It is to be secured in the bench vise when used. Will you have the kindness to have the honorable club examine it and express their opinion.
S. D. J.

Mr. J's tool consists of a hollow stump or sort of anvil to rest the joint upon, while the punch came down from above upon the rivet, which is driven out with the hammer, as usual. Both the stump and the punch are held in a small cast-iron clamp bored out to keep them in line with each other, so that the punch should drive straight. The whole is neatly japanned, and make a handy tool for the purpose.

HOW TO COLOR GOLD.

Secretary of Horological Club:

Would you please place before your honorable body the following question? I wish to know the value of all the ingredients used in coloring gold of any and every quality, the way to mix them, and all in connection with making a first-class colored gold finish? If you would be so good as to throw as much light on this subject as possible, you will confer a favor.
C. M.

Mr. Clerkenwell replied that our entire proceedings would not afford space enough to give all the information called for by our correspondent, and we can only here furnish him with some general instructions and one or two formulae for gold-coloring baths, which are highly recommended. Various processes for coloring gold have been fully described in the CIRCULAR, in the back volumes, which he will do well to obtain and study if he desires fuller details.

"Coloring" gold articles is a process for dissolving out more or less of the alloy, to give them a surface having a different quality or fineness from its previous surface. For good gold, that is, 18 K. or

finer, melt in a common pipkin the following articles: No. 1.—Alum, 3 ounces; nitrate of potassa (saltpeter), 6 ounces; sulphate of zinc, 3 ounces; common salt, 3 ounces. When melted, mix well together, and immerse the articles to be colored in it, removing occasionally to examine the color. When the color appears satisfactory remove the articles, place them on a piece of sheet iron and allow to cool, then immerse in dilute sulphuric or acetic acid, which will remove the flux, after which they may be rinsed in warm water, to which a little potash or soda has been added, and finally brushed with hot soap and water, again rinsed in hot water, and dried in clean warm box-wood sawdust.

For inferior qualities of gold, that is, from 18 K. down to 12 K., use the following composition: No. 2.—Nitrate of potassa (saltpeter), 4 ounces; alum, 2 ounces; common salt, 2 ounces. Add warm water enough to make the whole into a thin paste, place it in a small pipkin or crucible, and boil. Attach a thin wire to the article to be colored, and hang it in the paste, allowing it to remain from ten to twenty minutes. Then remove it, rinse in hot water, treat it with the scratch-brush, rinse again, and replace in the coloring pot for a few minutes. The length of time it is subjected to the action of the coloring bath depends of course on the amount of alloy to be removed. When the color suits, the article is removed, rinsed and scratch-brushed as before, then brushed with soap and hot water, again rinsed in hot water, and dried in the saw-dust.

When the articles are of as low quality as 12 K., if they are slightly made, great care must be used or the coloring process will eat away so much of their substance as to destroy their strength. The coloring paste should not be used on articles lower than 12 K.

Electro-plated articles are often colored, but they must have a good thick plate on in order to stand it. The following is considered a good composition: No. 3.—Sulphate of copper, 2 dwts.; French verdigris, 4½ dwts.; chloride of ammonium (sal ammoniac), 4 dwts.; nitrate of potassa, 4 dwts.; acetic acid, about 20 dwts.

Reduce the sulphate of copper, sal ammoniac and saltpeter to a powder in a mortar, then add the verdigris, and finally pour in the acetic acid, a little at a time, stirring it well all the while, till the whole becomes a bluish-green mass. Dip the article to be colored in this, then place on a piece of sheet copper, and heat over a clear charcoal or coke fire till it becomes black. Then let it cool, after which put it into a tolerable strong pickle of sulphuric acid and water to dissolve off the flux, rinse well in hot water containing a little potash or soda, brush with soap and hot water, and dry in the saw-dust. If the article is scratch-brushed being colored, it will come out of the pickle perfectly bright.

Another preparation for coloring either gold or plated articles is: No. 4.—Nitrate of potash, 5 oz.; alum, 2 oz.; sulphate of iron, 1 oz.; sulphate of zinc, 1 oz. Mix well together, then add water to form a thin paste. Dip the article in this, gently shake off any superfluous paste, place on a piece of sheet copper and heat till dry. Then increase the heat for two or three minutes, plunge into cold water, and finish as before described.

Preparation No. 1 may also be used for coloring plated goods (heavily plated), by dipping the articles in and heating, etc., as described under No. 4, till nearly black, then plunge into cold water and finish as there directed.

Gilt articles of poor color (as well as gold articles) may be improved by the use of gilder's wax, No. 1; beeswax, 4 parts; verdigris, 1 part; sulphate of copper, 1 part. Melt and mix well together. No. 2.—Beeswax, 5 parts; alum, 1 part; verdigris, 1½ part; red ochre, 1 part. Melt the beeswax and mix well together.

This wax is used by heating the article, rubbing the compound over it, then placing it on red-hot charcoal till the wax is all burned off. Place in very dilute sulphuric acid to clean it, scratch-brush it, wash, etc., as before.

Nearly every manufacturer has his own secret process for "coloring" gold, which they are not at all likely to give away. But the

foregoing processes are considered good, and will doubtless meet all the cases our correspondent is likely to need them for.

WHAT STOPS IT?

Secretary of Horological Club:

I have a fine Swiss watch, Breguet spring, and it is in apparent good order, and will run all night face down, but turn it face up, or suspend with Fig. 3 up (it being a hunter case), and the motion is considerably retarded, and it stops after a short time in either of those positions. The cap jewels are sound and all right, and the hair spring and roller table free. I notice it always stops with a 'scape wheel tooth on the locking face of the receiving pallet. Will some of your honorable body please give me some information as to where the trouble is likely to be found?

A. D. O.

Mr. Horologer thought the trouble would be found in the jewel fittings, if the hair-spring and roller-table were really free in all positions. Either one or more hole jewels on the balance, lever, or escape-wheel were loose in their settings, holes too large or too small (allowing either too much play or too freedom enough), or possibly a pivot was slightly bent, or roughened, causing it to bind a little in the hole when in a certain position. Sometimes a fine sliver of the peg-wood was left in the hole and produced the same effect where the shoulder was nearest to the jewel.

Mr. O. should consult Excelsior's directions for examining the lower escapement, where he will find instructions for detecting almost every conceivable cause of stoppage. If he has not got them, and cannot keep the watch long enough to obtain them, the best thing he can do is to examine the escapement thoroughly on the points just mentioned, and give the entire escapement a recleaning, including the escape wheel and its holes. Also examine if the lower fork and pallets are tight on the arbor. By doing so he will doubtless discover the difficulty before he gets through.

HEAVY FOOT LATHE WANTED—HOW TO LEARN TO MAKE PLAIN RINGS.

Secretary of Horological Club:

Will some of your "distinguished body" please inform me where I can purchase a heavy foot lathe like the one spoken of in "Advice to Watchmakers' Apprentices"? Also, how can I learn to make plain gold and silver rings without working under a manufacturing jeweler? and you will greatly oblige,

B. H. W.

Mr. Blowpipe said that the kind of lathe referred was such as is used by model makers and other workers in light metal wares. It was not a part of the stock of dealers in watchmakers' tools, but he must look among machinists who use light lathes, or apply to dealers in machinists' tools. As for learning to make gold and silver rings, it would be best for him to get some instructions from a good workman on melting, refining, and annealing gold and silver, see him make some rings from beginning to end, and then depend on his own "gumption" to do the same thing by himself. Get some good books on gold and silver working; study and experiment, and in time he will learn a great deal. But he could not expect to become a proficient without learning the trade—as with—any more than in any other trade.

HALL'S PATENT STAKING TOOLS AND ROLLER REMOVER.

A complete set of these tools was now brought out for examination by the Club, and elicited their highest commendations for splendid finish, perfect workmanship, and perfect fitting. All agreed that they were the *ne plus ultra* of staking tools—nearly every member having them in actual use, and knowing their value by experience. There was one tool in the set, however, which was new,—called the "Yankee Roller Remover." To this the manufacturers desired the special attention of the Club, and they examined it with much interest. It is a very simple, ingenious, and efficient tool, constructed on sound mechanical principles, strong, durable, and not liable to get out of order, nicely made and finished,—like all of the "Hall" tools, nickel plated, and withal very cheap,—the price being only \$1.25. The members decided that it was a worthy addition to "the best" staking tools in the market. They also examined a very

handsome gold medal awarded to the Messrs. Hall at the last Vermont State Fair for "the best watchmaker's tools," and congratulated the recipients on this recognition of their value. The medal may be seen for a short time at the office of the JEWELERS' CIRCULAR by all interested.

RULES DIVIDED TO 1-1,000 EACH.

Secretary of Horological Club:

Will Excelsior, or some of your members, inform me where I can get a rule with the inch divided in one thousand parts, as Excelsior recommends in his articles on watch repairing? I wrote to Frasse & Co., and they sent me Darling, Brown & Sharpe's Catalogue, and said that they did not make a rule so finely divided, and I failed to find any in Kenfel & Essen's Catalogue of Mathematical Instruments.

J. D. H.

Mr. Uhrmacher said if Mr. H. would get one of Grossmann's micrometers for watchmakers he will have a tool which will measure to the 1-1,000 of an inch. Darling, Brown & Sharpe also sell similar instruments, as will be seen on their catalogue. He did not think that Excelsior spoke of a rule divided into thousandths of an inch, although such a rule could be made by dividing an inch into hundreds, drawing ten horizontal parallel lines (all covering a square inch), with the top and bottom lines connected by vertical parallel lines, which would divide the inch into little squares of 1-100 inch each. Then connect the top of the first vertical line with the bottom of the second, by drawing a fine, oblique straight line exactly to the marks. In the same way connect each vertical line with the next, and he would have an inch (or as large or small a space as he saw fit to mark), which would give 1-1,000 inch. For example, from the first vertical to the next is 1-100; from the first vertical line to the second oblique line (measured along the second horizontal line), would be $1-100 + 1-1,000 = .011$ inch, or eleven one-thousandths of an inch. The same, measured on the sixth horizontal line, would give $1-100 + 6-1,000 = .016$ inch, and so on. As the oblique line advances 1-100 inch in passing 10 horizontal lines, it advances 1-1,000 inch in passing each one of those lines. These lines must all be exceedingly fine, and Mr. H. will find it better to get a tool to measure 1-1,000 inch, than to try to make a rule divided to 1-1,000 inch, or to use such a rule with any ordinary calipers or measuring instruments. D., B. & S. sell both calipers and micrometers divided to 1-1,000 inch.

WHY WATCHES DIFFER.

Secretary of Horological Club:

Will the Horological Club please enlighten me, and possibly some other country watchmakers, as to the cause of watches, of one make and grade, varying so much—one from another? Some will do well for a time; others, like a balky horse, go by fits and starts; while occasionally one performs so well that we are almost led to regard it as magical. Even some of the quick beat American watches are anything but satisfactory; they will not take a good motion. What is the remedy? The difficulty seems to be constitutional. One would suppose that thirty years' experience at watchmaking in this country should have given them the opportunity to master the trade.

VRGINIUS.

"EXCELSIOR" VISITS THE CLUB—GRAND OVATION TO THE FAMOUS AUTHOR OF "PRACTICAL HINTS ON WATCH-REPAIRING."

At this stage of the proceedings D. H. Hopkinson, Esq., and an elderly gentleman unknown to the Club, advanced to the Chairman's desk, and the former stated that he had the pleasure of introducing to the Club his distinguished contributor "Excelsior." Upon this announcement the Club took a temporary recess, during which the eminent writer of Practical Hints received a genuine ovation, the members vying with each other in their efforts to shake his arm from his body, and their expressions of esteem and regard for him. After a long and pleasant social intercourse, the Chairman declared that this incident must be formally put upon the record in the proceedings, called the Club to order, and made the following remarks:

Gentlemen of the Horological Club: We have this evening a long-wished-for pleasure in the visit of the distinguished horological

author, "Excelsior." Our proceedings bear witness that the Club has from the first recognized the value of his articles, and during the six or eight years that they have continued we have constantly commended them to the trade, have endorsed them as strictly trustworthy as a reliable guide at the work-bench, and have advised every workman to obtain and study them, and follow their teachings. We have naturally felt, and frequently expressed, a wish to make the personal acquaintance of the author of these famous papers,—a wish which is at length gratified.

We are pained to learn that Practical Hints have been brought to a close, but hope that the interruption may be but a temporary one, and that with returning health another series of them may again monthly gladden the hosts of watchmakers. He had never known a case where a technical serial had been so highly and so universally commended as these. Continued year after year in the largest, most widely circulated, handsomest and best trade journal in the world—our own *Jewelers' Circular*—they had gone to every country where English reading workmen are to be found, and everywhere they had received the same hearty and unqualified approval, had been copied by other journals abroad, and had become a standard and authority on the subjects of which they treat. It was needless to say that all this was due to their real solid merits. We are only too glad to add our testimony to those merits. Their eminent author (who, we are happy to say, was early elected an honorary member of the Club) has already been presented, some four or five years ago, with a gold medal from the watchmakers of America, as a token of their esteem. But he thought this was an opportune time to present him with another gold medal, in token of the continued and increased appreciation of his labors by the trade. It has been well said by the proprietor of the *Circular* (than whom, he would remark, a more liberal, enterprising and public-spirited publisher does not exist) that "Excelsior" had undoubtedly done more for the information and improvement of practical watchmakers in this country than any other living man,—and he deserves all the honors that we or they could shower upon him. He declared himself in favor of another gold medal for "Excelsior," as a thank-offering from the entire watchmakers' and jewelers' trade of America, and called upon the members to express their sentiments, which they did, enthusiastically endorsing the Chairman's remarks, and approving of the proposed medal.

"Excelsior" then responded in fitting terms, thanking the Club for their kind reception, and their hearty commendation of the work he had done. While sensible of many deficiencies, he was also conscious that he had always conscientiously done the best he was able to do in the limited time at his disposal and the requirements of his business affairs. At present his health was so broken that he was unable to attend to his business alone, as it should be, and it was therefore impossible for him to continue his writing, which required more time than would be supposed, in order to make the articles thorough, complete, and accurate in even the smallest details. His intention had always been not to publish anything upon which the workman might not implicitly rely as being accurate in every respect. Whether he should ever be able to resume his work was, of course, uncertain. He had no expectation of ever doing so. He should in the future, as in the past, always take pleasure in doing everything in his power to promote the welfare and advancement of the trade, but he was unable to say anything definite as to his future course. As for the proposed medal, he positively declined it, and emphatically insisted that no movement whatever should be made towards obtaining one. He felt confident that his work was appreciated by the trade, and that was a sufficient reward for him.

He then referred to the proceedings of the evening, saying that the Club was doing a good work. Its existence and ability to labor did not depend on the health of any one man, and he therefore hoped that it would continue to flourish for an unlimited time, increasing its usefulness more and more, till its "Proceedings" should come to be regularly consulted by all workmen as a monthly bulletin, with the latest and best information on every point.

He also approved of their commendation of the Hall Staking Tools, saying that it had for years stood at the head of the list, and still did,—always becoming better and better. What new improvement the manufacturers would be able to add he could not say. But they would no doubt always keep good their claim to making "the best." He finally requested that his personality should be regarded as confidential by the gentlemen present.

Here a surprise awaited the distinguished visitor, for the Secretary then came forward and stated that he had been requested by the manufacturers, after it had been examined by the Club, to forward

the Hall Staking Tool and attachments to "Excelsior," as a present from them, with their highest regards,—and he now presented them to him in person. "Excelsior" accepted the gift with many thanks to the donors, and the Club then adjourned.

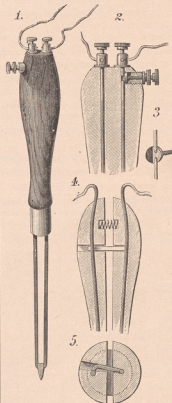
Soldering by Electricity.

THE more electricity is utilized the greater is its promise of future utility. Familiarity with it brings to the surface more inventors, each one intent upon applying to practical uses this invisible power that has lain comparatively dormant so long. As one invention after another proves its value, and is introduced into our workshops, others follow in such rapid succession that the originators can fix no limit to its possibilities. The indications now are that in the near future, in addition to being used for illuminating purposes, it will supply our railroads and steamboats, and our great manufacturing establishments, with their motive power. In small things as well as the greater ones, electricity is demonstrating its tractability, and the ready facility with which it adapts itself to the wants of man. One of the latest electric novelties is a device by means of which soldering of all kinds can be done.

The accompanying engraving shows a soldering iron heated by the electric current, and capable of melting all kinds of solders, such as gold and silver solder, which have heretofore required a blow-pipe to melt them. It may also be used for the more fusible solders employed in making tin-ware. Now that the electric current is distributed so generally, and is used for all manner of purposes, it seems quite practicable to employ it for soldering.

Figs. 1, 2 and 3 show one form of electric soldering iron, Fig. 1 being a perspective view, Fig. 2 a section showing the switch for controlling the current, and Fig. 3 a detail view of the switch-button. Figs. 4 and 5 are views of a modified form of the device. In Figs. 1 and 2 the electric conductors extend through and project beyond the handle, and embrace a piece of platinum, or other material offering sufficient resistance to the passage of the electric current to become heated more or less according to the strength of the current. One of the conductors is separated near the upper end of the handle, and bridged by a button made partly of electrical conducting material and partly of insulating material, so that by turning the button the circuit may be completed or broken as circumstances may require. The device shown in Figs. 4 and 5 is on the same general principle, the only difference being that the handle is split lengthwise, and the two portions are pressed apart by a spring. When apart to their fullest extent a hook attached to one of the conductors touches the other conductor and short circuits the current in the handle. When the two halves of the handle are pressed together the current passes through the refractory point.

When the point is heated to incandescence the tool may be used for melting either silver or gold solder. For melting soft solder the heat may be less intense. This invention was recently patented by Mr. C. E. Ball, of Philadelphia, Pa.



Gem Engraving.

BY AN EXPERT.

IN cameo engraving as in intaglio, the first and most essential step is modeling; but the relief or cameo model has the advantage in appearance. Indeed if the instructions given below are carried out, it would be difficult to find a more beautiful work of art than a wax model for a cameo; and one hardly dare hope to realize in stone the beauty of the wax model. In this article we will assume that we are about to model and cut a cameo portrait of a lady in profile. A piece of thick plate glass is procured eight or ten inches square, and at least one-fourth of an inch thick. Next select an old Ezra Kelly watch oil bottle with a thick, strong bottom, use this as a muller, as painters grind their colors, with number one emery, until one side of your glass slab is completely depolished, or converted into ground glass. Wash the slab and muller (oil bottle) and let them dry. The next thing in order is to get some dry zinc white, the French is the best; now with your muller crush the zinc white as fine as possible, this is best done on your glass slab, not by rubbing it round and round as painters do in grinding colors, but by heaping the color, and catching a little of it under the edge of your muller and drawing it towards you; in this way the particles can be crushed very fine by repeatedly going over it. Now heat your glass slab until it will melt white wax; it need not be hot enough to make the wax perfectly fluid, but so it will be like thick cream. If you have pulverized on your glass slab say one-fourth of an ounce of zinc white, add one-half an ounce of white wax, and as soon as it melts grind the two ingredients together with your muller, as the painters do, going round and round, keeping the mass together in the middle as much as possible. This mixture of wax and zinc white is the material you will use to model your head with, and it can be poured on paper as directed for the red wax in a former article. It resembles in color and translucency the finest white onyx. By adding more zinc white it can be made to resemble porcelain, and will cut crisper in very warm weather; but the pupil will soon learn all of this, and vary the mixture to his immediate wants. This composition can be cut out to the general form and applied to black glass—the glass prepared as described for red, but using black sealing wax. The glass for black backgrounds should be ground or depolished, using the ground side to model on, as the polished black surface is too glistening. But by far the nicest background is made of wood as described below. Such models displayed in shop windows on elegant little easels, are very attractive. Now for the manner of producing our wood backgrounds for cameo models. Any fine grained hard wood will answer, and should be about one-fourth of an inch thick, oval in form, four inches long by three wide is a good size. The surface should be convex, so as to leave the edge a scant eighth of an inch thick, and can readily be made by any man working in wood, the great point being to have the convex surface true. Such wood backgrounds are to be painted with a varnish made by dissolving shellac in alcohol to the consistency of thin paint, and adding enough Vandyke brown (in dry powder,) to give a rich dark brown. The color of these backgrounds should be very dark, indeed as dark a brown as can be and not be absolutely black. The great objection to black is, it is too cold. The mixture of shellac and Vandyke brown is painted on the wood with a large size camel's hair pencil (brush) allowing an hour to elapse between coats. About every three coats the surface should be rubbed with very fine sandpaper, No. o, or co, if you can get the latter, and for the final finish rub two pieces of sandpaper together until one breaks the other down. If you desire to produce a very fine surface for the final finish, after the last sandpapering, apply a very thin coat of shellac, and when thoroughly dry rub the convex surface with a piece of cotton flannel folded eight double, and very fine ground pumice stone and water. If you should wish, for the sake of variety, some grounds not quite so dark, you can use raw or burnt umber, either mixed with the Vandyke brown, or the umber and shellac alone. In preparing such backgrounds it is well to make

six or eight at a time, as they will consume but little more time than you would in getting up one or two. I should have mentioned that before sandpapering the panels should be allowed to stand more than one hour. Perhaps I had better repeat the process: coat with shellac and Vandyke brown, let it dry an hour, coat with shellac again with an hour between coats, till three coats are on, then let it dry three hours before sandpapering; repeat this order until you have nine coats, and then finish with pumice stone and cotton flannel. The back of the panel will not need but three coats and one sandpapering, finishing with a thin coat, which will need no further attention. Cut out a piece of the wax and zinc white of the general form you require and press it on the surface of your panel or black glass in the position you wish it to occupy. If it is on the glass, a full (or a little above) blood heat can be applied to the glass, but the wood panels have to be dealt with carefully, or the heat will blister the shellac surface; but if the panels are well dried between coats, and the shellac covers them entirely, edges and all, they can be dipped in water which is full blood heat, until heated through, then wiped dry and the wax will adhere readily and be soft enough to be moved about to get it in the right position. The surface of such panels can be left smooth and dull, which is the most beautiful, as it gives us sharp reflected lights to detract from the white relief model; but if it is desired the surface of the shellac can be made brilliant by polishing. This can be done by rubbing it with fine rotten stone and olive oil on the soft side of cotton flannel, folded as described above, until all the minute scratches made by the pumice stone are removed. Wash with soap and water, then rinse in clear water and dry with a soft clean chamois. A final finish of extreme polish can be obtained with dry rye flour and the palm of the hand. The panels should stand at least a week after the pumice stone rubbing before attempting the rotten stone and oil polish. I said in the commencement of this article that we would speak as if a portrait of a lady was to be modeled and engraved. Here commence difficulties which are not in the wax or stone, but in pleasing your sitter—I suppose we may be permitted to use the expression as long as we are to produce a "portrait." You will find notions and caprices which are hard to overcome, for in matters of art I have found that people who were well educated in literary matters, were in this respect deplorably deficient, and what was still worse, actually the victim of a perverted taste. It needs nice tact to get people, especially ladies, off their hobbies, and still it must be done to succeed in cameo portraits. First among these difficulties is to induce a lady to abandon the idea that she must be dressed in the extreme of fashion, both in dress and the manner of wearing the hair. Generally a compromise can be effected by adopting something of the manner of the antique. If you are situated so that you can make arrangement with a hairdresser who has given this style (the antique,) some attention, it will be a boon to you. Get your sitter to submit to such a hairdresser, and at the same time let the dress be arranged in something like classic taste. Now have a photo taken in profile, of the size you intend to model. A careful study of the picture will generally suggest some changes which can be done in modeling. In my last article I made especial mention of the study and treatment of hair and drapery, and promised at that time to resume the subject in this. In large statuary fine flowing, graceful hair is difficult to manage, and the reader can easily understand how much more difficult it must be in a head, probably less than one-fourth of an inch in length. It is only by arranging the hair in as large masses as possible that anything like grace can be retained, and even then something like exaggeration must be resorted to, to produce the effect, as it will be seen that a mass of hair two inches across in the living sitter will only be one-sixteenth of an inch in the head one-fourth of an inch long. After your model is complete, submit it to the sitter and her friends, so as to have all the alterations made in the wax. Such a course is much better than any drawings, or in fact any course; for after the wax model is accepted, you have the matter all in your own hands, and the cutting is only a mechanical copy to exact measurement of the wax model. The modeling is done the same as the red wax, except that you must remember that the entire method of cutting has to be reversed. But do not so much mind the manner of cutting—let the model be as elegant and as beautiful as possible. Although in cheap work one must, to a certain extent, forget these maxims.

Defects of Clickwork.

THE correction of the clickwork pertains to the most important work of the repairer, and should receive his unqualified attention when adjusting or repairing a watch. Daily ocular proofs reveal the fact that many watchmakers are unacquainted with this part of the mechanism. The observant repairer can testify that a number of watches, otherwise well in a good state of preservation, come under his hands for repairs whose barrel is scratched and disfigured by unskillful hands. In one, repairs have become necessary on the barrel arbor, in consequence of broken barrel teeth; another one demands a new clickspring; and these accidents originate chiefly in unsatisfactory and unskillful repairs.

The friction of the barrel arbor requires to be regulated first. Watches of the better quality have the ratchet sloping on both sides, not to injure the cap; the repairer had better do it when he finds it wanting. To do this, place the barrel arbor in the screw head tool, and slightly bevel the teeth of the ratchet with the Arkansas stone; clean the dirt from the teeth, using a ratchet file, as the dirt is apt to adhere inside, then place the barrel arbor in the bridge and screw down the cap with all the screws. When a screw does not draw well, replace it by a new one, but do not by any means try to make it fit by flattening it, or, as the writer has already met with in his practice, by riveting it. Moreover, no screw end should protrude, but must be neatly rounded off.

If the ratchet of the barrel arbor possesses too much friction, or works too hard, do not try to correct it by loosening the screws; this remedy would only be temporary, because the screws loosen themselves little by little, at every winding of the watch, and after a while would fall out altogether. Others do not correct the strong friction but think the ratchet would learn better manners after a while, and adapt itself to circumstances; the cap is most generally injured in such a condition, and brass dust is the result which may find its way into the movement. The cap screws, again, suffer because compelled to resist too much force, and they do not unfrequently snap off, conducive to the standing still of the watch.

If the friction of the barrel is too great or too little, either fault is best corrected on the cap; in the first case, turn out a little from the inside in such a manner that the pressure is eased, increasing the turning out at the spot where the teeth revolve. In the second case, turn off a little from the outer surface, whereby the pressure upon the wheel is increased, and pay especial attention that the pressure exerted by the cap is located at the center and not upon the ratchet teeth, thus maintaining the friction without variation, and at uniform rate.

Where the friction is too great and additional deepening of the sink in the bridge cannot always be depended upon, because in many instances the barrel cannot be placed deeper, and the effectiveness of the bridge is often weakened; therefore deepen the sink only, when the barrel can be placed to better advantage. Some repairers place the cap upon a hollow riveting tool, and give it a correspondingly hollow shape; this remedy merely transfers the friction to the teeth points; by a small friction a forced or bent down cap is equally objectionable, the screws are compelled to withstand too much pressure and are apt to fly off; the good appearance of the cap also suffers, and a turning down under the same is after all the best remedy.

When the friction of the barrel arbor is in order, take the side clickspring in hand. Why has a pin been put at the foot of the clickspring, and of what utility is it if the spring foot does not rest upon the plate or screw-hole and screws are fitting to each other, in case the screw should become loose? How few watches are seen where the screw hole is proportioned to the screw and where the foot pin is in condition to prevent any up or down motion of the spring. When the screw hole is larger than the screw, the foot pin, of course, assists the screw in its effectiveness, but its true function is only to prevent the up and down motion of the clickspring. Let the re-

pairer make it a point that the foot of the spring rests at all times upon the plate, because a deviation of its position becomes thereby impossible.

Do not allow the clickspring to have a very short foot, but try it in the following manner: Screw the bridge upon the plate loosely, screw the clickspring in its place and try, catching at the hook, to move up or down; if it resists the foot is suitable, if moveable, the foot is too short. To remedy the fault, take a strip of brass plate, fasten it in the hand vise, scratch it clean, wet it with soldering fluid, and let a minute quantity of tin run upon it. Next take the clickspring, scrape the lowest side of its foot, also wet it with soldering fluid, then hold the brass plate over an alcohol flame, so that the clickspring remains outside the reach of the flame; the tin will fuse in a short time without injury to the spring or letting it on. Next file the foot in a fitting shape, in such a manner that the hook closes nicely with the cap or with the bridge, and you have obtained in such a manner a clickspring which serves all the purposes for which it is intended.

Next dismount the cap, try the clickwork, until the hook touches the bottom of each ratchet tooth; it must not permit the least motion to the ratchet.

In case the deepening of the clickwork is too shallow, it is better to file down the bridge than to disfigure the clickspring. To do this, screw the cap again in its place, for which purpose two screws, standing diagonally to each other, are sufficient to save time, and satisfy yourself that the cap does not interfere with the functions of the click spring; if this is the case, dismount and remedy by carefully filing; rectify it thus that the clickspring of the ratchet is kept distant from the cap by about the thickness of a sheet of paper, to permit, by a possible wear of the hook, a polishing of the spring afterward. Should the spring be too strong place it in the hand vise in such a manner that the polished upper surface stands above it, to prevent an accidental injury; lay it upon a piece of wood or a cork, so that the hook may reach across over to the other side; gently draw it toward you so that the hook may imbed itself in the wood or cork, and file it thinner. When sufficiently weakened, lay it on another clean cork and give the place a nice clean appearance with the Arkansas stone.

A clickwork with click must receive the additional attention that it shall be neither too high nor too low. File down in the first case, so that the screw head rests upon the shoulder, but does not hinder the click in performing its function. If this is too thin replace it by a new one, but never shorten or lower the shoulder, to prevent an up or down motion, because if necessity should demand at some future time to put in a new one, this would have to be filed accordingly.—GUSTAV MENZER, in *Allg. Jour. d'Uhrm.*, Nov. 5, 1880.

Restoring the Lustre of Silver.

HERMAN BUSH gives the following, relative to restoring the lustre of silver, in the *Horological Journal*:

The best way for restoring the original dead or lustrous whiteness of silver goods, lost or impaired by exposure to sulphurous atmospheres, or by having been too often and perhaps carelessly cleaned is effected by annealing in charcoal fire, or before a flame of the gas or oil-lamp, by means of a blow pipe, which effects the destroying of all organic matter adhering to the surface of the articles, and at the same time oxidizing on the surface the base metals with which the silver is alloyed. The articles are allowed to cool, and then immersed in a boiling, or at least hot solution, consisting of from one to five parts of sulphuric acid, and twenty parts of water—the quantity of acid depends upon the quality of the silver the articles are made of, the coarser the silver the more acidulated. The boiling in this solution has the effect of dissolving the extracted deposit of oxide, and leaving a coating of pure or fine silver on the surface. The time for allowing the articles to remain in the solution also depends on the quality of the silver, whilst good sterling

silver will be whitened in almost an instant, commoner silver will take a minute, or even longer; care is, however, to be taken not to allow the articles to remain too long in the solution, which would turn the surface into an unseemly greyish color, and the manipulation will have to be commenced afresh; if the silver is very common, as guards or alberts by some Birmingham makers, the articles will require to be repeatedly treated in this manner before the desired whiteness is obtained, and in some cases will even have to be silvered galvanically. As soon as the desired whiteness of the articles whilst in the acid is observed, they are removed and quickly thrown into lukewarm water; it is advisable to have an additional vessel with warm water at hand to place the articles in after having been removed from the first. The articles are then immersed in box-wood sawdust, kept in an iron vessel near the stove, or any warm place, when, after thoroughly drying in the sawdust, the articles will be found to look like new. Any places on the articles desired to look bright, are burnished with a steel burnisher.

The annealing, prior to placing the articles into the acid solution, requires some care and attention, or else the workmanship of the goods will be irretrievably lost; it is first of all necessary to closely examine the articles, whether they have been soft-soldered previously, as under such circumstances they are unfit to be annealed, as the heat necessary for annealing would burn the solder into the articles and produce blemishes past remedy. It is, secondly, necessary to remove all stones, steel, or any material not silver, or liable to be injured in the fire, and it is also advisable to remove pins—tongues—from brooches or spiral springs attached to some very showy ornaments to produce a shaking or trembling, greatly admired in artistic jewelry, in order to preserve the hardness of the pins, and the elasticity of the springs. After being satisfied that these precautions have been observed, and the articles are, without risk, fit to be annealed, another precaution, and especially for mechanics not accustomed to such work, will be of great utility to observe, which is, to prevent an either over or under heating. If the article is overheated it is liable to melt, and if under-heated, the organic matter adhering is not effectually destroyed, and the surface not sufficiently oxidized. In order to obtain the required degree of heat, and running no risk of either under or overheating, the article is held with a pair of pincers very close over the flame of a lamp, so as to be covered with soot all over, and then exposed before the blast of a flame by means of a blow-pipe, until the soot burns or disappears, when a quite sufficient, and yet not more heat than required, is obtained. The practice of this last precaution will greatly assist the manipulation and prevent occasional accidents.

Silver ornaments which have merely become oxidized by exposure in a sulphurous atmosphere, and not by repeatedly cleaning, are simply restored by brushing with a clean toothbrush and a little carbonate of soda.

Practical Hints on Watch Repairing.

By EXCELSIOR.—No. 70.

THE PRACTICAL EXAMINATION OF TOOTHED GEARING—CONCLUDED.

(1,100) In Fig. 78 contact occurs about 45° before the line of centers, showing that either the pinion is relatively too large, (or wheel too small,) the depth too shallow, or addenda of wheel teeth too



Fig. 78.

short. Inspection shows the depth to be much too shallow. We see also, by position 1, that if we move the wheel and pinion closer together, to correct the shallow depth, the first contact will still

occur much further from (before) the line of centers than it should, which shows that the pinion is much too large, also. As for the shape and length of the addenda, we can only judge by inspection of them, because under the circumstances, we cannot see how they would act on the pinion leaves if they were properly placed, and with a pinion of proper size. So judged, they are of the usual length, *i.e.*, slightly longer than the strictly epicycloidal addendum would be—and of good form. The addenda therefore require no change, but a smaller pinion must be inserted and the depth made correct.



Fig. 79.

(1,101) In Fig. 79 we see no very serious fault—but we notice considerable slipping between positions 5 and 1; and in position 1 we see that the point of the tooth is nearly off the leaf, and that the first contact occurs about 6° (or a little less than one-third the thickness of a leaf,) before the line of centers—all of which indicate either a pinion relatively too small (or wheel too large), addenda too short, or depth wrong. Inspection of positions 1, 2 and 3 shows that the depth is correct; the action of the tooth upon the leaf in positions 4 and 5 proves that the addendum is well formed, and inspection shows that it is not over short, but has the correct epicycloidal form and the length due to that form. But as we are aware that, with an epicycloidal tooth and a correct depth, contact should occur 20° before the center, (with a 6-leaf pinion,) we conclude that the pinion is relatively too small, thus causing the first contact to be delayed. Otherwise we have found the gearing good. This gearing is not strictly correct, therefore, but it would be safe to pass it by unaltered, if in a movement of ordinary quality, although the driving would not be uniform and there would be considerable friction and liability to wear. Had the pinion been as much too large as it is too small, however, a correction would have been necessary. The reason for this difference of treatment, or, rather, the difference in the action of a pinion too large and one too small, which makes one error excusable (if slight,) while the other is not, has been fully explained in previous articles and need not be repeated.

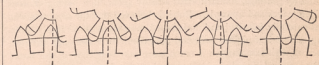


Fig. 80.

(1,102) In Fig. 80 first contact occurs about 50° (the thickness of two and one-half leaves of the pinion,) before the line of centers, showing that either the pinion is relatively much too large, or else the depth is much too shallow and the addenda much too short. Inspection of position 5 proves that the depth is correct, and inspection of the addenda shows that they are not too short, but, on the contrary, are longer than strict theory requires, *i.e.*, are longer than the true epicycloidal addendum. Hence the excessive amount of driving before the line of centers, becoming an actual butting in position 1, is due wholly to the pinion being relatively much too large. We must therefore fit in a smaller pinion, and then change the center distance to secure a correct depth, after which we shall have a good gearing.



Fig. 81.

(1,103) Fig. 81 shows a gearing which makes first contact at the right distance before the center for an epicycloidal tooth and a 6-leaf pinion, *viz.* 20° , or the thickness of one leaf. But we see by posi-

tions 1, 2 and 3, that the depth is much too shallow. We therefore inquire how it is that, notwithstanding this, the contact still begins at the proper point. The natural effect of a scant depth is to cause first contact to occur further from (before) the line of centers, proving the existence of some error in the gearing which causes contact to occur later than is natural or proper, and which in this case just equalled and neutralized the contrary effect of the shallow depth. The action of the driving tooth in positions 5 and 1, and inspection of its shape, show that it has the correct epicycloidal form of curve and length of addendum. We therefore conclude that the pinion must be relatively too small, (or wheel relatively large), inasmuch as that is the only remaining cause for this action. And we know that if the pinion was too large it would increase the amount of the driving before the center—whereas, that has been decreased by the error in the pinion, proving that it must be too small.

(1,104) But, as there is no drop nor pointing, notwithstanding the scant depth, we know that the pinion cannot be very much too small. After fitting in a slightly larger pinion, we must also change the depth, to correct the remainder of the error, which will make a good gearing. Or, instead of both fitting a larger pinion and bringing it and the wheel nearer together, we may avoid changing the depth by putting in a pinion a very little larger than we would do if following the former method of correction, and then enlarging the wheel to meet it properly, and thus fill up the scant depth by enlarging both in the proper proportions. The exact size which each part should have to make a good gearing can be ascertained by measurement of the center distance, and calculation from that and the numbers of the teeth and leaves, for doing which full directions have been given. If we prefer the long form of addendum, we can lengthen the addenda of all the teeth while enlarging the wheel, according to the instructions given in previous articles.

(1,105) In the figures the teeth and leaves have always been shown as having correct forms and proportions, but merely unsuitable for each other. There is another large class of faulty gearings, in which the teeth and leaves themselves are improperly formed, imperfect, injured, changed by incompetent workmen, and the like. It might be instructive to give illustrations of such errors, explain the best ways of detecting and correcting them, etc., did circumstances permit.

(1,106) It would also be interesting to study a series of illustrations of faulty gearings, similar to that already given, but having pinions of ten leaves and upwards. But it is believed that the workman who has carefully followed and understood the examples of faulty gearings with 6-leaf pinions, will find no difficulty in examining the former, as their examination is much more easy than that of the latter. The same rules apply in both cases, but the former should be free from some of the faults which are looked upon as unavoidable with the latter, at least to some extent. For example, for pinions of less than ten leaves, some driving before the center is allowable, and the distance before the line of centers at which the first contact of the leaf and pinion should occur has been ascertained, and the exact amounts which will give the best results in practice have been fixed for such pinions, of each number. But in high numbered pinions, *i. e.*, those having over 10 leaves, any driving before the center is regarded as evidence of a pinion relatively too large, depth shallow, or addenda of the teeth too short. The first contact is expected to occur exactly on the line of centers, *i. e.*, when the joined surfaces of the acting tooth and leaf are in a line between the centers of the pivots of the wheel and the pinion, called meeting on the "line of centers." If first contact takes place either before or after that point, it shows an error of some kind in the gearing. Pinions with ten leaves are classed with the "high numbered pinions," and, if carefully and properly executed, they are governed by the same rules. But if not properly proportioned, *i. e.*, the wheel and pinion suited to each other, and the pinion specially formed for avoiding any driving before the center, it will occur to a greater or less extent, and such pinions must be classed with the "low-numbered pinions." But as all these matters have been fully explained in previous articles,

illustrations and detailed explanations are unnecessary to intelligent workmen who have attentively studied those already given.

(1,107) There are a number of other points which the writer had intended to consider in this series of articles, but increasing infirmities demand that his whole available time be given to his private business affairs, and he therefore now brings Practical Hints on Watch Repairing to a close. While sensible of the fact that he might have made them better had he been able to give more time to preparing them, he has spared no pains to have them as thorough and complete as was possible under the interruptions and harassments incident to necessary attention to his business, (which all who are in business will understand and appreciate,) and above all, he has endeavored to have them strictly accurate, even in the smallest details, so that the workman could implicitly rely upon them as a practical guide. This determination to be correct has constantly necessitated the examination, testing, and comparison of many discordant plans, theories, and processes, in order to decide which was really the best, or most likely to meet the actual requirements and needs of the work-shop and to recommend only that—and has caused the preparation of the articles to occupy treble the time which would have sufficed to write off-hand statements of opinion, or descriptions of methods personally followed. He therefore believes that the workman who will study Practical Hints, and intelligently follow their directions, cannot go astray nor fail to be benefited. He also hopes that other members of the trade will take up the task which he now lays down, and contribute from their experience, for the benefit of the trade at large. In conclusion, he thanks the trade for their hearty approval of his works, as constantly expressed by their letters, and otherwise, and although the most of them were, are, and may always remain unknown to him, he would assure them, one and all, that their esteem is none the less grateful to his feelings and none the less appreciated by him.

Early Indian Art.

THE only notice of gold plate in the Rig Veda is a mention of gold cups, but the references to jewelry are so frequent that the precious metal and stones must have been familiar to the Aryan immigrants from their earliest settlement. Yet no specimen of the art of gold-working has been met with which can with any certainty be attributed to the ancient period of Indian history. The oldest example now extant was found by Mr. Masson, about 40 years ago, in a Buddhist tope, in the neighborhood of Jalalabad. In the center of the tope was a small apartment constructed of squares of slate. A steatite vase was found in it, besides mold and the ashes of burned pearls, a gold casket filled with similar remains. By its side were four copper coins, by which the monument is assigned to one of the dynasty of Greco-barbaric kings who ruled the north-west of India about half a century before the Christian era. The ornaments of this casket are extremely curious. The Greek feeling apparent in them is most interesting. A plate of silver of similar design was long in possession of a family, the Mirs of Badakshan, who claimed to be descendants of Alexander the Great. Dr. Birdwood sees in these relics distinct evidence of the influence of Alexander's invasion on the arts of India. The Greeks, he asserts, had conquered all this part of India, had established a monarchy, and issued a coinage. Their money is well known, and is thoroughly Greek in character. Moreover, in the travels of Apollonius of Tyana he is said to have come upon remnants of Greek civilization and language in the former Kingdom of Porus. The Buddhistic sculptures in the Punjab are due, says Dr. Birdwood, to Greek rather than Byzantine influence. It is true that their exact date is unknown. They may have been carved at any time in the thousand years between the middle of the third century B. C. and the middle of the eighth of our reckoning, and those which are later than A. D. 300 may have been influenced by Constantinople. But the date of this gold casket proves that its Greek look is due to direct Greek inspiration, and many specimens of carving in stone are now recognized as betraying a similar origin.—*Saturday Review*.

The Wedding Ring.

[Continued from page 38.]

In old times, when the use of rings was confined to those who had a right to wear them, and when maiden's fingers were usually free from such ornaments, the betrothal ring was a special sign and distinction which marked the wearer as belonging to another person. The wife has other proof of her marriage besides her wedding ring, but the betrothal ring, unlike the engaged ring of the present day, which is a mere gift from a lover, was legal evidence of a contract. The brooch is frequently associated with the ring as a precious gift to be given by the lover to her wooed. In the ballad of *Young Beowulf*, a lady's lovers are said to have "wooded her with brooch and ring," &c. In the *Cruel Sister* we are told of the hero that—

He courted the eldest with glove and ring,
But he lo'ed the youngest aboon a' thing,
He courted the eldest wi' brooch and knife,
But he lo'ed the youngest aboon his life.

It was formerly a custom observed both in France and England, for the man to give the woman he espoused a betrothing penny as earnest money of her purchase. One of these small pieces of silver is inscribed with the words *Denirs de foy pour epouser*; and on one side is engraved a heart between two hands, and on the other two *fleurs de lis*. The complete ceremony of espousals usually consisted of four several actions, which were: I. The interchanging of rings, a practice of which there is much evidence in our literature; thus Chaucer writes in *Troilus and Criseide* (book iii.)

Some after this they spake of sondry things
As fill to purpose of this adventure,
And playing enterechangen her rings
Of which I cannot tellen no scripture.
But well I wot, a breche of gold and assure
In which a rubie set was like an herte
Cresiede him yave, and stacke it on his sherte.

In Scott's *Minstrelsy of the Border* we learn that Lord Gregory exchanged a gold ring for a diamond one with Anne of Lochryan, and that that lady reminds him of the occasion in these lines:—

O dinna ye mind, Lord Gregory,
As we sat at the wine,
We chang'd the rings frae our fingers
And I can show thee thine?
O yours was gude and gude enough
But ay the best was mine;
For yours was o' the good yae good
But mine was o' the diamond fine.

Sometimes the man only gave a ring, but according to the ritual of the Greek Church, the priest placed a ring on the finger of each of the parties, and the two afterwards exchanged them. II. The mystic kiss which was mutually given, was supposed to cause the spirits of the two to commingle. When the ceremony took place in private, and not at church, the spouses drank each other's health, a practice referred to by Middleton in *No Wit Like a Woman's*:

Ev'n when my lip touched the contracting cup.

III. The joining of hands, and, IV., The testimony of witnesses; that of the priest was sufficient, but there were usually several present at the ceremony. In *Twelfth Night* Shakespeare beautifully describes these four actions. The priest says:—

A contract of eternal bond of love
Confirm'd by mutual joind'r of your hands,
Attested by the holy close of lips,
Strengthened by interchanging of your rings;
And all the ceremony of this compact
Seal'd in my function, by my testimony.

It was not absolutely necessary that the espousals should take place in a church, but it was customary, and although Olivia, in *Twelfth Night*, is clandestinely betrothed, she still wishes the ceremony to be performed in a sacred building, and says to Sebastian:—

Now go with me, and with this holy man
Into the chantry by: there before him
And underneath that consecrated roof
Pledge me the full assurance of your faith;
That my most jealous and too doubtful soul
May live at peace. He shall conceal it
Whiles* you are willing it shall come to note;
What time we will our celebration keep
According to my birth.

* Until.

We must now pass on to the wedding ring itself. A bride's three

ornaments were formerly: 1. A ring on her finger, which betokened true love. 2. A brooch on her breast, which betokened cleanness of heart and chastity. 3. A garland on her head, which was a crown of victory, gladness and dignity. The wearing of this garland is incidentally illustrated by a curious tale written in the fifteenth century by Adam of Cobsam, and printed by Mr. Furnivall in 1865 (*Early English Text Society*). The *Wright's Chaste Wife* is a witty account of a certain carpenter that was married to a poor widow's daughter. The mother having no goods to give with her daughter, gave the husband a rose garland which he was to consider as a precious jewel because it would never fade while the wife kept truly her faith to her husband. The tale relates the adventures of certain men who come to the carpenter's house when he is away and try to make his wife forget her duty. Roses continued to be considered the peculiarly appropriate ornament of a bride almost to our own times, as appears by the favorite song "She Wore a Wreath of Roses," but now those beautiful flowers have been superseded by orange blossoms, as roses had before taken the place of wheat-ears.

The wedding ring in olden times was blessed and sprinkled with holy water before it was used, and a special service was prepared for the purpose. The appearance of the ring varied according to the fancy of the maker; thus some rings were adorned with gems, some were plain and others were engraved. The serpent with its tail in its mouth as indicating endless affection was a frequent symbol used in early Christian times, and the clasped hands or *fides* was another. The wedding ring, under the Lower Empire, usually contained a stone, on which was engraved the heads of the bride and bridegroom, but among the Christians the head of some favorite saint was a more general ornament. The likeness of St. Margaret, the protectress of women through the perils of childbirth was frequently used, and the motto attached to this representation was usually "Be of Good Heart." The names of the wedded pair were, as a rule, engraved upon the ring. The practice of placing mottoes upon rings was nearly universal less than two centuries ago, and it is strange that so pretty a custom should have been allowed to fall completely out of use. The Greeks and Romans engraved mottoes on their rings such as, May you live long; Live happy; I bring good fortune to the wearer; I give this love pledge. The word "Remember" has been found engraved on a stone above the representation of a hand pulling the lobe of an ear. This action was a sign of affection, and Napoleon I., when he was in a particularly good humor with anyone about him would pull him by the ear. Many of the mottoes upon English rings are of the most commonplace character, as

When this you see	or,	Despise not me
Remember me		That joys in thee
	or, If you deny	
	Then sure I die	

and are amenable to Gratiانو's unflattering description of Nerissa's gift to him:

About a hoop of gold, a paltry ring
That she did give me; whose poetry was,
For all the world like cutler's poetry
Upon a knife, Leave me and leave me not.

Others are better, as

Desire
Like fire
Doth still aspire.
Constancy and heaven are round
And in this the Emblem's found.
Weare me out, Love shall not waste.
Love beyond Tyne still is plac'd.
Weare this text, and when you looke
Upon your finger, swear by th' booke.

Many of these mottoes were only used for tokens of friendship, or of separated love, but the majority were intended for wedding or betrothal rings, as

Our contract	Not two but one
Was Heaven's act	Till life be gone
God above	I will be yours
Encrease our love	While breath endures
In thee my choice	My heart and I
I do rejoice	Until I dye

When posies, as they were called, were common, the dull posies required some assistance in the composition or selection, and in 1624

a curious little book entitled "Love's Garland, or Posies for Rings, Handkerchers and Gloves, and such pretty Tokens that Lovers send their Loves," was published to supply this want. We will give here some of these specially intended for rings:—

All perfect love	A happy breast
Is from above	Where love doth rest
The sight of this	Where once I choose
Deserves a kisse	I nere refuse
In trust	Not lust but love
Be just	As time shall prove
To love as I do thee	Be true to me
Is to love none but mee	As I to thee
To me till death	In thee a flame
As deare as breath	In me the same
Nere joy the heart	Thou mine
That seeks to part	I thine
No hap so hard	No crosse so strange
As love debarred	My love shall change
No bitter smart	Rather dye
Can change my heart	Then faith deny
Heart's content	I live if I (eye)
Can nere repent	If no, I dye,

The man who chose the posy, "As faithful as I find," agreed better with the writer of the song, "If she be not kind to me, what care I how fair she be," than with the inventors of the above mottoes.

The wedding rings of kings were often of considerable value, and usually of gold; thus Henry V.'s wedding ring was made from one that he used at his coronation, and Henry VII. paid for his an amount equal to seven pounds at the present day, but gold had not in old times the pre-eminence as a material for rings which it at present enjoys. Rings have been made of silver, which is supposed to be symbolical of sweetness and melodiousness, of iron and steel as the representatives of durability, of copper, brass, leather and sedge, and persons have been legally married with curtain rings and the bows of keys.

Among the Jews it is different, for the wedding ring must be of a certain value, and moreover it must not be borrowed for the marriage, as it is sometimes among the Irish, but must be the absolute property of the bridegroom.

In old times rings were frequently worn on all the fingers—

On ilk an fynger scho weirt rings two,
Scho was als proud as any paping;

Freirs of Berwick.

but the ring finger *par excellence* has long been the fourth finger, counting the thumb as the first, the thumb, however, at times almost superseded it; thus Chaucer, in the *Squire's Tale*, makes two references to the latter practice:—

Upon his thombe he had of gold a ring,
And by his side a naked sword hanging;

The other is on a magic ring:—

The vertue of this ring, if ye wol here,
Is this, that if hire lit it for to were
Upon hire thombe, or in hire purse it bere,
There is no foule that fleeth under heaven
That sche ne schal wel understand.

There is a very old and widespread superstition that the fourth finger of the left hand (which is the peculiar place for the wedding ring) is in a very special way connected with the heart. In Somersetshire it is believed that this finger has the power of curing any sore or wound that is stroked by it. The same healing properties are more generally attributed to the ring itself. The old divines never tired of pointing out the symbolical character of the wedding ring, and even now many women believe in portents connected with their rings. They will not take them off, and are in dismay if the worn-out band snaps or bursts. It was these beliefs and superstitions that horrified the Puritans, and made them attempt the hopeless task of abolishing the ring:—

Others were for abolishing
That tool of matrimony, a ring
With which the unsanctified bridegroom
Is marry'd only to a thumbe;
(As wise as ringing of a pig
That us'd to break up ground and dig);
The bride to nothing but her will
That mulls the after marriage still.

Since then no attempt has ever been made to abolish the wedding

ring, although in the present age "reformers" have arisen who have wished to abolish marriage itself. However, until that undesirable consummation takes place it is improbable that the wedding ring will ever go out of fashion, because women are usually the most conservative of our race, and are not likely to give up willingly what they hold so dear.

Views of Correspondents.

This department of *THE CIRCULAR* is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

To the Editor of the Jewelers' Circular:

TEXAS, as you know, has a most outrageous tax law that requires all traveling salesmen to pay a license of \$200 for selling goods within the State, and inflicts heavy penalties upon any one violating its provisions. Occasionally some chap is smart enough to get around it. This is the way a certain firm of New York do it. Their traveler seems to carry a little of everything, and makes a "big blow" of his diamonds. He travels from place to place and makes arrangements with some jeweler or pawnbroker to permit him to put up at his place of business, agreeing to pay a certain per centage on all goods sold and allow the retail jeweler to select all he wishes (of course for cash). He stays and advertises loudly for a few days, then quits and seeks a more lucrative field. He travels from place to place and never pays any license. This is a good thing and should be made known to more of the trade who are not up to it. There is no reason why some should pay the enormous tax and others slip through under the lawful pretense of exhibiting their goods only.

T. B. H.

[A State that will put such obstructions in the way of universal commerce as a \$200 license tax deserves to be swindled. When State or city legislators enact laws placing taxation upon business coming to them from the outside, they may think they are raising revenue from citizens of other States, but they are grossly mistaken. For every dollar so paid by outside merchants the people with whom they deal have to pay at least one hundred cents. The merchant simply adds the tax to the price of his goods—probably, in a spirit of vexation, he will double it for his own benefit. The better class of dealers will not pay the license fee required by the State of Texas, and the field is, therefore, left open to shysters. It is rather hard on the local dealers to be cut off from the visits of the enterprising travelers in the trade, and they should unite to secure a repeal of the obnoxious law.]—EDITOR THE CIRCULAR.]

To the Editor of the Jewelers' Circular:

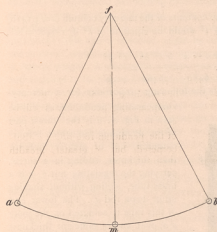
In my travels through the various Western and Southwestern States I find that the retail trade are complaining bitterly that certain New York jobbers are indulging in the practice of sending out catalogues and price lists promiscuously, to persons not connected with the trade, and offering to sell them goods by retail at wholesale prices. This practice cannot be too severely reprehended. It robs the retail dealer of his legitimate trade, without which he cannot redeem his obligations to the very jobbers who are robbing him. Some Chicago jobbers were formerly in the habit of seeking this surreptitious retail trade, until the retail dealers of the West raised a storm of indignation against them and forced them to stop it. It was this illegitimate practice, more than any other one thing, that caused the formation of State Associations of retail dealers, who thus organized for self protection. A fundamental principle of their organization is not to buy from jobbers who seek to steal their customers away from them. The New York dealers engaged in this unbusinesslike traffic will do well to take a hint and abandon it before it becomes necessary to impress the hint upon them in a forcible manner. Nothing so thoroughly demoralizes and discourages the retail dealer as to find the very men from whom he buys his stock offering their goods to his customers at the same prices at which they sell to him. When jobbers resort to such small devices to obtain custom, they must not be surprised to see the retail dealers going into bankruptcy or offering twenty cents on the dollar to compromise their indebtedness.

OLD TRAVELER.

The Pendulum.

CALCULATION OF THE WHEELWORK—CONSTRUCTION OF A CLOCK WITH A SECONDS PENDULUM.

BY a simple or mathematical pendulum is understood a weighty body, suspended at the end of a thin cord. If the ball is moved out of its point of rest, that is, if it is moved from its vertical position, it will endeavor to regain it, and swing until attained, in the same vertical line. If the pendulum is brought into position f , a , indicated in Fig. 1, it will describe the arc $a m$. It arrives with such velocity at m that it ascends on the other side to b , to an even height with a ; from here it returns and describes the arc $b m a$, and continues its oscillations in this manner.



The momentum of the pendulum increases in its descent, decreases in its ascent, and when it passes its center of rest, its momentum decreases. The movement from a to b or from b to a is called oscillation. The angle $a f m$ is called the amplitude or arc of oscillation from the point of rest to the outer line, and is expressed in degrees, minutes and seconds. The time of oscillation

is the time occupied by the pendulum to accomplish its motion from a to b .

It might be supposed that the motion of the pendulum would continue forever, because when starting at a , it rises to the same height at b ; thence back from b to a , and so on *ad infinitum*. This would be true, if several causes did not militate against it, such as the friction at f , the resistance of air and its displacement by the weight, the attraction of gravity, &c., combine and force it to stand still; the decrease of length only becomes noticeable after a number of oscillations, and it is rather a cause of wonderment that they continue for so long a time; a pendulum set in motion will oscillate for hours before being overcome by its *vis inertia*.

LAWS OF OSCILLATION OF THE PENDULUM.

The laws of oscillation are the following: 1. The duration of smaller oscillations of the same pendulum is independent of its arc of oscillation—that is, the small oscillations are isochronous. If, for example, a pendulum swings in an arc of oscillation of 2° or 3° , the duration is as large as if the arc were only 1° or $1^\circ 10'$. 2. The duration of the pendulum oscillations is independent of the weight of the body suspended or the nature of its substance. The body may be of gold, lead, wood, or wax; may weigh 500 pounds, 100 pounds, or 50 pounds—if the length of suspension is the same, the body of wax, weighing 50 pounds, will accomplish its motion in identically the same time as that of gold weighing 500 pounds. 3. The durations of oscillation of two pendulums of unequal length are proportioned to each other as are the square roots of their lengths. If, for example, their lengths are as 1, 4, 9, &c., the corresponding durations of oscillation are as their square roots, 1, 2, 3, &c. We will see further on, that this law is of great service in the calculation of the lengths or numbers of oscillations, in the construction of one beating seconds.

THE SECONDS PENDULUM.

Shortly after Galileo had discovered the laws of the pendulum, Huyghens gained great fame among men of science by his excellent researches thereon. He proposed to adopt the length of the seconds pendulum as unity for measurement of length, under the sup-

position that such pendulum length would be everywhere the same. Newton disputed it, without being able, however, to produce satisfactory reasons. England adopted the proposition in so far as to accept and legally fix the measure of the "yard" in proportion to the seconds pendulum of London. The French revolutionists appointed a committee, with instructions to fix upon an unalterable standard upon which to base a measurement. The gentlemen constituting this committee examined, but did not adopt, this standard, since it contained another, and a foreign element—time—and decided to take the 40-millionth part of a meridian of the earth as unity, which they called "meter."

Already in the year 1672, the French astronomer Richer had found in his voyage to Cayenne (5° N. of the Equator) that his astronomical pendulum clock, when placed in position, lost at the rate of $2\frac{1}{2}$ minutes per day, and he had to shorten the rod more than two millimeters to regulate the rate; when he returned to Paris the clock gained considerably, and the pendulum had to be lengthened again. It was hereby proven that the same pendulum did not make the same oscillations at different parts of the earth; the closest observations, at different places and different latitudes were made, by which the length of the seconds pendulum was established. The cause for this difference may be sought for partly in the fact that the earth is not a truly round ball, but is flattened somewhat toward the poles—a spheroid—(1.292), the pendulum is consequently farther from the center of gravity at the equator than at the poles, which causes the attraction of gravity to act in a manner different than it does at the poles, and partly in the centrifugal power, which grows stronger toward the Equator, and very materially lessens the action of attraction of gravity, while it decreases toward the poles, and becomes almost null.

The following table gives the length of the seconds pendulum for different localities:

LOCALITY.	LATITUDE.	LENGTH IN MILLIMETERS.
St. Thomas.....	$0^\circ 24' 42''$	990.84
Maranham.....	$2^\circ 31' 42''$ S.	990.84
Ascension.....	$7^\circ 55' 48''$ S.	991.15
Sierra Leona.....	$5^\circ 29' 28''$ N.	991.02
Trinidad.....	$10^\circ 38' 56''$ N.	991.02
Bahia.....	$15^\circ 59' 21''$ S.	991.15
Jamaica.....	$17^\circ 56' 7''$ N.	991.42
New York.....	$40^\circ 42' 43''$ N.	993.15
Paris.....	$48^\circ 50'$ N.	993.86
London.....	$51^\circ 31' 8''$ N.	994.07
Berlin.....	$52^\circ 34'$ N.	994.26
Drontheim.....	$63^\circ 25' 54''$ N.	995.21
Hammerfest.....	$70^\circ 40' 5''$ N.	995.49
Greenland.....	$74^\circ 32' 19''$ N.	995.69
Spitzbergen.....	$79^\circ 49' 58''$ N.	995.99

CALCULATION FOR THE LENGTH OF A SIMPLE PENDULUM.

Since we know the length of a seconds pendulum, that is, a pendulum which shall make 3,600 oscillations, and must be 994 mm. in length, it is easy, by the assistance of law 3, given above, to calculate the number of oscillations for each pendulum length, or *vice versa*, to determine how many oscillations a given length of pendulum must make. A pendulum swinging 3,600 times in one hour, will be proportioned to one which makes 7,200 in the same time, as is $7,200 \times 7,200 \times 3,600 = 994 : x$, or as $51,840,000 : 12,960,000 = 994 : x$.

Dividing the product of the known inner quantities by the known outer quantity, we have:

$$\frac{12,960,000 \times 994}{51,840,000} = x = 248.5 \text{ mm.}$$

THE GRIDIRON PENDULUM.

It is known that heat expands all bodies, metals included; a common pendulum clock exposed to the different changes of temperature of our climate will indicate the fact in its rate—the rod becomes shorter in winter, the clock gains; longer in summer, the clock loses. The construction of the gridiron pendulum is based upon the knowledge of the expansion of the metals, and by a peculiar arrangement the influence of the temperature upon the rate of the clock is equalized—compensated. For house use, a pine-wood rod fully answers

all purposes; but for astronomical clocks or regulators the greatest nicety of adjustment is necessary, for obvious reasons, and we will endeavor to explain the different modes of compensation.

It is all important to know the rates (coefficients) of expansion of the different metals, also their respective qualities as heat conductors. Care must be had when projecting a gridiron pendulum to construct it so that the lengths of the three unequal iron rods shall stand in an inverse ratio to that of the two zinc rods, as does the rate of expansion of iron to that of zinc. Such a pendulum, according to U. Jürgensen, is proportioned as follows: Three iron and two zinc rods are connected with each other in such a manner that an iron rod is placed in the center and on either outside, as will be seen in the accompanying figure 1: *a a* are two iron rods fastened in the upper and lower crosspieces *b b* and *c c*. The central iron rod to whose upper end the suspension spring is fastened, passes freely through the upper crosspiece *b b*, and below enters into a brass tube which is fastened into the crosspiece *c c* by means of a screw. This central rod reaches into the brass tube to about 1 centimeter above the crosspiece *c c*, and is secured within it by a pin. The two zinc rods, *d* and *d*, are fastened in the crosspiece *b b* and *c c*. The bob is suspended from the crosspiece *c c*. The pendulum compensates the influence of a raised temperature in the following manner:

The center rod and its brass tube expand and slide *e e* down. The two zinc rods do the same, but push *b b* up. The bob, also, obeying the expansion of the lead with which it is filled, and resting upon the nut *u*, cannot sink down, consequently moves upward. By decreasing temperature the contrary takes place.

To give the proportions of such a pendulum, let us assume that the bob has a diameter of 16 centimetres; only its upward expansion need be considered; the distance from the center of gravity of the pendulum to the circumference of the bob might be assumed as about 12 cm.; length of zinc rods, each 50 cm.; outer iron rods, each 52 cm.; central iron rod, from point of expansion to fastening in brass tube, 60 cm.; brass tube to pin, 13 cm.; iron rod passing through bob, 18 cm. The added lengths of the parts expanding downwardly and lengthen the pendulum, are, 52 cm. + 60 cm. + 18 = 130 cm. iron and 13 cm. brass tube. The zinc rods which force the pendulum up have a combined length of 50 cm., and the lead in the bob also lifts with a force equal to a length of 12 cm. The pendulum will be found, therefore, to be truly proportioned, because the 130 cm. iron and 13 cm. brass expand as much as the 50 cm. zinc and 12 cm. lead.

It is necessary to test every gridiron pendulum by the pyrometer, even if it has been constructed on truly scientific principles; it may happen that the homogeneity of its different parts is not what it should be. The construction of a perfectly compensated pendulum demands a care and presupposes a thorough knowledge of physical laws. The small moveable part *p* called the runner, attached by Huyghens, has nothing to do with the compensation; it is slid up or down, to alter the center of oscillation within a small compass.

THE MERCURY PENDULUM.

Let us imagine that the center of oscillation coincides with the center of gravity of the bob; *L* expresses the length of the pendulum rod; *K* stands for the expansion of the metal of which the rod is

composed; consequently, *L K* will be the rising or falling of the body of mercury for 1° of difference of temperature. The mercury, whose height is designated by *h*, will endeavor at the same time to alter the point of gravity in proportion to the bottom of the vessel by $K^1 - K^1$ has been assumed as the ratio of expansion of the mercury; its ratio, according to Dulong and Petit, by 1° difference of temperature, is 1.6480. The following equation would be correct, to determine the height of the mercury in the vessel by which he compensation is produced:

$$L K = \frac{h}{2} K^1$$

Suppose *a r*² to be the contents of the mercury column (*a* = 3.1416) its ratio of expansion by 1° would be equal to (*a r*² *h*) 1.6480 = *K*¹, whence follows:

$$L K = \frac{h a r^2 h}{2 \cdot 6480} = \frac{a r^2 h^2}{26480} = \frac{r^2 h^2}{4127}$$

Jürgensen recommends the following proportions for a mercury-

compensating pendulum, as will be seen in Fig. 2: *a* is the lowest part of the pendulum rod, which is four-cornered, but of greater breadth than thickness, ending in a screw, carrying the regulating nut *b*; *c* is a brass tube, sliding without shaking up or down rod *a*. The lower end of this tube is soldered on the plate *d d*, oval, and of sufficient thickness to sustain the weight of the mercury upon it without bending. Plate *d d* is supported by piece *e*, which rests upon the nut *b*. The screw upon which the nut operates passes through a hole as well of piece *e* as of plate *d d*. Two cylindrical glass vessels, *g* and *h*, are placed upon the plate *d d*, as is shown in the figure; two brass rings, fastened on the plate and surrounding the vessels from below, serve to retain

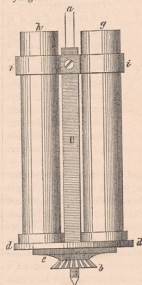


FIG. 2

them in place, while the piece *i i*, more fully shown in Fig. 3, and

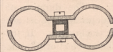


FIG. 3.

also be attached.

The receptacles for the mercury are generally made of glass, and must, of course, be truly cylindrical within; moreover, both must be of exactly of the same dimensions. Objections are urged against glass, such as being a bad conductor of heat, etc., and iron is recommended; but glass possesses the advantage of ease and security in filling, prevention of air bubbles, etc. The change of temperature is never so sudden or violent that well grounded fears might be entertained against its use.

THE EBONIT (HARD CAOUTCHOUC) PENDULUM.

A compensation pendulum of recent construction, based upon the property of the vulcanized caoutchouc or ebonit to extend in nearly the same ratio as mercury, from 0° to 70°.*

Its rod is of steel, the lower end provided with a nut, upon which rests an ebonit shell, which surrounds the steel rod up to a certain

*Note.—Reaumur's scale is always understood in these and other translations from the German. He locates his freezing point of water at 0 degrees, which with our, Fahrenheit's scale, would be 32 degrees, and places his boiling point of water at 80 degrees, or 212 degrees F.

height; the pendulum bob is replaced by a cylindrical brass weight, perforated to a certain depth from below, into which the ebonit shell enters, and the weight thus rests upon it; by an increase of temperature, the steel rod is lengthened, which is compensated, however, by the proportionate expansion of the ebonit shell, and the consequent raising of the bob. The bob must be of such a shape that it cuts through the air with ease, and its flat construction is the most adaptable for the purpose.

Carefully conducted experiments have established that the air offers little resistance and has hardly any influence upon the oscillations. It has been found to amount to only about 0.5 of a second within 24 hours, between the highest and lowest points of the barometer, but auxiliary compensated pendulums have already been constructed to equalize even this little difference. The weight of a pendulum must be different in every clock, and in tenor with the escapement and the movement; this much, however, might be remembered, that a heavy one is easier regulated and corrects any irregularities rather than one of lighter weight. A clock with a heavy pendulum is better sensitive and requires to be placed firmly; long ones also are more sensitive than shorter ones, but they offer increased facilities in regulating. Two thin steel springs placed together can be recommended as the best method of suspension; it requires greater care in making them, but this is more than compensated by the increased regular motion of the pendulum. The fastening must be very secure and solid.

THE CONICAL, ROTATING, OR CENTRIFUGAL PENDULUM.

If to a pendulum freely suspended by a thread, is imparted a correspondingly fitting blow, it will describe a circle around the point of inertia, and in these conditions it is called a conical, rotating, or centrifugal pendulum. Its time of oscillation is twice as large as that of a common pendulum of the same length. This kind is often used in sick-rooms, or for nervous people, on account of their noiseless rate; they are mostly used in small clocks, and suspended by a silk thread. A special escapement is superfluous; the lower end of the pendulum moves within a fork which is fastened to the last wheel, placed vertically; several peculiar escapements have been connected therewith. An excellent clock with this kind of pendulum was exposed at the Paris Exhibition and was universally admired. It has also been introduced in astronomical clocks, as well as for a motor to revolve astronomical instruments, &c. The suspension is made as well from a few rings, one of which, by means of pivots, is movable in the other, or by double springs, of which one is fastened to the others, and are placed in the form of a cross, as can be seen by front view of Fig. 4, and side view of Fig. 5.

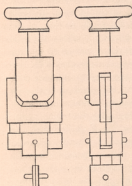


FIG. 4.

FIG. 5.

THE DOUBLE PENDULUM

Consists of a simple one whose rod is lengthened beyond its point of suspension, and there carries a weight whose position may be altered, the weight of both bobs may be equal or different. A decrease of the weight of the upper bob, or of the pendulum bob accelerates the oscillations; a like procedure applied on the lower one accomplishes the opposite results. Larger clocks, especially steeple clocks, have lately been provided with these pendulums, and they are greatly praised. A pendulum of 248.5 mm. in length, and making 2 oscillations per second, can by lengthening its rod about by 175 mm. above and the addition of another bob of the same weight as the lower one, be changed into a seconds pendulum. If the same ends are desired to be procured by a lighter bob, it is necessary to lengthen the upper rod still more. The regulating of a double pendulum is best done on the upper bob. The rocking clocks, with figures for upper bobs, are constructed on this pattern; the lower weights move within the case.

CALCULATION OF WHEELWORK AND NUMBER OF OSCILLATIONS.

To calculate the oscillation number of a pendulum or a balance wheel for the space of one hour, commence at the wheel which revolves the minute hand once an hour—that is, from the center wheel; notice has to be taken of the fact that each tooth of the escapement causes two vibrations of the pendulum or balance wheel, and that each wheel is driven by the preceding one, for one revolution of the latter, so many times as the number of its pinion leaves is contained in the number of wheel teeth, or, as many time as the acting diameter of the pinion is contained in that of the wheel. Therefore multiply the number of teeth commencing at the center wheel (but twice the number of scapewheel teeth) and divide the sum so found by the sum of the multiplied number of pinion leaves. The pendulum and cord are to be supplied in a pendulum clock.

The escape wheel has 40 teeth, its pinion 20 leaves.
 " fourth " 60 " " 10 "
 " " 75 " " 10 "
 " center " 80 " " 10 "
 " spring barrel " 156 " " 10 "
 $80 \times 75 \times 60 \times 2 \times 10$
 $= 8 \times 75 \times 6 = 3,600$ oscillations.

$10 \times 10 \times 20$

How many turns of cord must there be around the barrel to make the clock go ten days? The center wheel turns 24 times a day, in 10 days 240 times. The barrel wheel drives a 10-leaf pinion, whence one revolution causes the clock to go 15.6 hours, and we have

$\frac{240}{15.6}$
 $= 15.4$ turns for the cord.

The number of escape wheel teeth is required to cause the balance to make 16,800 vibrations per hour.

Center wheel, 80 teeth,
 Third " 60 " its pinion 8 leaves,
 Fourth " 26 " " 8 "
 Escape " " " 7 "
 $80 \times 60 \times 56$

We have $\frac{80 \times 60 \times 56}{8 \times 8 \times 7} = 10 \times 15 \times 4 = 600$ revolutions of the escape wheel.

Half the number of vibrations $\frac{8400}{600} = 14$ gives the number of the escape wheel teeth.

A clock is required to make a given number of oscillations, but the manufacturer is uncertain about the number of teeth for the wheels. The *modus operandi* is as follows: Suppose it to be a clock with a seconds pendulum, making 3,600 oscillations per hour; the pinions to contain 12 leaves; only one wheel is put between center wheel and escape wheel, thus only the center wheel pinion and escape wheel pinion need be considered. The number of leaves is multiplied by each other, and since each tooth of the escape wheel occasions two oscillations of the pendulum, the sum thus found is multiplied by half of the number of oscillations. Thus $12 \times 12 \times 1800 = 259200$. We next obtain the prime numbers and with them form the requisite factors, which are multiplied with each other, and from which we choose the corresponding number of teeth.

$259,200 \div 2 = 129,600$	$259,200 \div 3 = 86,400$
$\div 2 = 64,800$	$\div 3 = 28,800$
$\div 2 = 32,400$	$\div 3 = 9,600$
$\div 2 = 16,200$	$\div 3 = 3,200$
$\div 2 = 8,100$	$\div 5 = 640$
$\div 2 = 4,050$	$\div 5 = 128$
$\div 2 = 2,025$	

We have, consequently, the numbers 2, 2, 2, 2, 2, 2, 3, 3, 3, 5, 5, from which we take the escape wheel, which, owing to the seconds, must have 30 teeth.

$2 \times 3 \times 5 = 30$ teeth for the escape wheel,
 $2 \times 3 \times 3 \times 5 = 90$ " " " third wheel,
 $2 \times 2 \times 2 \times 2 \times 3 = 96$ " " " center wheel.

If, in place of the number of pendulum oscillations of the pendulum or balance, the number of revolutions of the last wheel is given, the number of pinion leaves is multiplied with each other, then with the number of revolutions; obtain the prime numbers from this sum,

and divide them as suits your convenience or necessity, into factors corresponding to the number of pinions. After the above given explanations, the operator will have no difficulties in solving any problem of number of oscillations, of teeth, pinion leaves, wheel revolutions, &c.

The greater part of the watches manufactured at present make 18,000 vibrations per hour, very small cylinder watches and chronometers excepted, which range from 14,000 to 21,600; different experiments have established 18,000 vibrations as the best suited for all purposes. The following table gives the number of teeth for watches with 18,000 vibrations; the escape wheel has been taken at 16 teeth:

Center wheel	3d wheel pinion	3d wheel	4th wheel pinion	4th wheel	Escape wheel pinion
80	10	75	10	80	8
80	10	75	10	70	7
80	10	75	10	60	6
80	10	70	8	60	7
80	10	60	8	60	6
75	10	70	8	64	7
64	8	70	8	60	7
64	8	60	8	60	6

Repairing Swiss Watches.

BY H. GANNEY.

[Continued from Page 42.]

THE difficulties incidental to the stop-work in Swiss watches are often solved by the repairer taking away one of the pieces, by preference the star wheel, leaving the center pieces to assist in supporting the barrel. In the future, doubtless stop-work in watches will be as rare as in clocks, which even of best foreign make are unprovided with them. The notion that they are necessary is incorrect, as a well hooked mainspring will resist a greater breaking strain than any other part of the watch, and though the pressure on the stop-work transmitted to the barrel teeth and center pinion is less than that caused by the pull of the mainspring hooked close to the barrel teeth, there is a certain elasticity in the mainspring which about equalizes the chance of damage from careless winding. The experience of the Americans is opposed to the stop-work, as, formerly using the Swiss stop-work to all but their lowest grade of work, when I was working in America, they now dispense with it in all their watches, though making many more varieties and much higher quality of work, in which price or amount of work is of no consequence. This would perhaps not be conclusive as to its value, knowing the preference for simple methods in their mechanism, but I have had their experience confirmed in a remarkable manner by Mr. Guye, of Clerkenwell, who, adopting the American system of work, has surpassed them in its application to more highly finished London work; and in interchanging all the parts of his theoretically perfect lever escapement, he has left them at present in the rear. Owing to the different lines on which business is conducted in the two countries, it is probably the merits of Mr. Guye's gallant attempt to redeem the prestige and trade of Clerkenwell will remain unknown beyond a select and interested circle, who will maintain a discreet silence, when depreciation is useless. Noticing the absence of stop-works from Mr. Guye's second quality work, I was told they only put it to their best work in deference to general prejudice on the stop-work question; but as a matter of fact the watches kept a better rate without stop-work, as fewer mainsprings broke, as the extra width obtained by the suppression of the stop-work gave a strength and elasticity unobtainable otherwise. With such testimony it is useless to contend, and the sooner watch buyers and wearers are enlightened on the subject the better, and with the stop-work will disappear a cause of much trouble to repairers.

Without a stop-work it is necessary that the mainspring be more carefully hooked, as any kind of hook is generally sufficient to retain

the spring when a stop-work is used; but when it is absent, care must be taken to use a hook not liable to be cut off by the action of the mainspring working on it, and care must be used to secure a round and sound hole in the spring, and with not more end left than is requisite to secure a sound hole, or the end will become a lever, and lift the mainspring off the hook.

The usual form of hook is a brass pin undercut, and is objectionable on account of its size and want of its strength, and is liable to be forced out as the watch runs down, or to have its undercut hook flattened when winding the spring; in both jobbing and new work we find nothing so good as a simple steel pin with a thread on it made in one of the smallest holes of the screw plate, fitted to a hole drilled in the barrel at a considerable angle to the center, and being screwed in tight and broken off from the outside saves filing the gilt barrel, then nipped off inside and filed away to a thickness slightly in excess of that of the mainspring. All extra length only renders it liable to pressure from the coils of the spring when down, besides destroying the capacity of the barrel for holding a long mainspring. A prolific cause of the mainsprings breaking is the barrel arbor being too small, causing too close a strain on the small coils of the spring. The trouble of putting a larger arbor in is sometimes avoided by putting in a higher hook, which increases the effective diameter of the arbor; but a better plan of taking off the destructive pressure on the center of mainspring, is the insertion of a loose coil of spring between the arbor and mainspring. In a properly proportioned barrel and spring, one-third of the space in the barrel is occupied by the arbor and another third by the mainspring, leaving a third for its working to and from the arbor.

The most effective form of barrel arbor and ratchet is the old form, now disused, for what reason it is difficult to tell, but it seems the law of change governs watch-making, even if there is no improvement; the only ratchet and click not liable to failure is that seen in old Swiss watches, with the ratchet held by three screws screwed into the steel barrel arbor, which gives the best possible holding for them, and this part of the arbor also forms the pivot and bearing for the arbor's support to the bar. Its large circumference prevents wear, and the effects of wear do not cause so much motion of the barrel extremities, and the pressure whilst winding is not on the hole and its thin sink, but on the large circumference embraced by the ratchet; its superiority is shown by the fact that watches with this form of ratchet with fifty years' wear are often seen in sounder condition in this part than modern ratchets and barrel arbors with only a few years' wear, and any damage to modern ratchets involves a new entire arbor, the ancient form involving only the replacing the ratchet if damaged in teeth by a new one, which if skilled with the file the jobber could make himself from a piece of round steel fitted tight on the winding square by opening with a broach; then the screw holes marked or drilled through the holes in the arbor; then reopened larger to let the winding-key through the ratchet; then two fine circles turned for size top and bottom of the teeth and a three-square file used to cut the teeth, great accuracy in which is not requisite for effectiveness, as the click will follow any sort of teeth in this arrangement and be effective.—*Watchmaker and Jeweler.*

(To be continued.)

The One Mechanic Buried in Westminster.

NOTWITHSTANDING England's enormous indebtedness to her mechanics, but one mechanical workman has ever been honored with a burial in Westminster Abbey, and that was Graham, the clockmaker. Graham made exact astronomy possible by his great improvements in timepieces. He invented the dead-beat escapement and the gridiron compensating pendulum, and he was the first to make clocks that would run for many days without winding. Graham was also a maker of great quadrants and instruments of that sort. His funeral was attended by all the members of the Royal Society.—*Scientific American.*

Adjusting and Repairing Watches.

(Continued from Page 44.)

IF the proportions are suitable, the cylinder not too thick or too far opened, its lips in order, the lifting surfaces of the wheel not too much inclined, place in the escapement in such a manner that the distance of both parts—the wheel and cylinder, permits when one tooth has dropped, that the point of the next one stands close to the outer wall of the cylinder at the point where the lifting begins. In like manner should the tooth inside fall upon the wall of the cylinder, from about two to four degrees, before the actual lifting commences. This takes place generally when the center of the inclined surface of the wheel-tooth passes straight through the center of the cylinder jewel hole.

Visible Depthings.—Before the wheelwork is removed, cause the depthing to revolve, either by winding the mainspring or by a pressure upon the spring barrel, and observe the depthing, as far as visible. That of the horizontal wheel may, by a flat jewel hole, be sometimes well observed by laying the watch flat upon its face and examining it with a strong glass; if not, raise and hold it against the light. Depthing which cannot be well seen or about which the repairer is in doubt, must afterward be singly examined by the touch. It is to be recommended to open a few holes in either the bridges or the plate to facilitate observations. Do not approach too near the jewel settings, however, and when done, have a care to fill them again to avoid difficulties.

Length of Balance Pivots; Centering of Balance Spring.—Unscrew the lower plate, and see if the lower pivot protrudes sufficiently, by turning the watch and pressing upon the balance accordingly. Remove the balance bridge and take the spring from the balance, setting it alone upon the bridge, to satisfy yourself that the roll lies exactly in the center, while its first coil may move with freedom between the curb-pins of the regulator, capable, however, of being fully governed by the regulator hand; if this is not the case, arrange the spring in order, and unscrew the index plate together with cap jewel, and satisfy yourself that also the upper pivot protrudes sufficiently through its jewel hole.

Thereupon place the balance in the double calliper, observe if it runs true and round, and is well equiposed; it occurs at times that balances of cylinder watches have been given intentionally a center of gravity, to lessen the work of regulating for the different positions; and when you operate upon an old watch, be not over anxious to establish a counterpoise, more especially if the owner has been satisfied with its rate heretofore.

Pivot shake.—Let the wheelwork rotate for a short space of time by drawing on the spring; if the running down is accompanied with a great noise, irregularity, or a jerking motion, it may safely be accepted that one of the depthings is faulty in consequence of badly shaped teeth or wide holes. To satisfy yourself, let the wheels run for a few times to and fro by a pressure with the finger upon the barrel rim, and see which one of the pivots runs shaky within its hole. A competent judgment is soon formed by a little practice and comparison, to know how much shake each pivot should have. Rotating the wheelwork in this manner, a bent pivot will also betray itself. Remove next the barrel bridge, together with belongings, and place it to one side.

Center Wheel; Inclined Wheels.—Take out the third wheel to satisfy yourself if the center wheel stands straight, and for this purpose insert an arbor in its pinion, retain it and revolve the plate, taking notice that this runs round and straight; before the repairer has the necessary practice, he may hold a card on the rim of the plate, and let it run; experience will reveal at first sight if a wheel stands straight or inclined in the plate.

Bushing the Center Wheel Holes.—If both holes require to be bushed, screw the center wheel bridge in its place, and widen both holes at the same time, turning the plate for this purpose between your fingers to satisfy yourself also by this manipulation that it runs straight, countersink the holes a little from both sides to accommodate the rivet

heads, and to prevent a future loosening or turning of the bushing, turn upon the arbor a few well fitting bushings, permit them to have a small shoulder, in case the wheel should require to be placed higher or deeper, and rivet them in firmly and neatly. Open both holes at one time, suitable for the pivots, and the wheel will stand straight. If only one hole requires bushing, say that of the bridge, which is screwed on, fasten the plate in the universal lathe, plant from below, widen the hole in the bridge, and proceed as above stated. Else simply open the hole, bush it out full, plant from the other one, and open the hole on the universal lathe.

Straightening the Center Wheel.—If the holes do not require bushing and the wheel is only a very little inclined, the fault may be remedied at times by bending the foot pins of the bridge a trifle, enlarging the pin holes in the plate correspondingly, with the rimmer or a small round file. The repairer may also place a brass or ivory punch upon the not tightly fastened bridge, and by a small blow with the hammer spring it sufficiently. Of course, it must be but a trifle. The center wheel pivots must be cylindrical, protrude somewhat beyond their holes, ends flat, which should be polished, with corners somewhat rounded; the holes should have a countersink for oil.

New Center Wheel Pivots.—Pinions otherwise in good order have their pivots sometimes so badly worn or so weak that a new one should be inserted, if the remuneration would permit it; sometimes it does not, and means to remedy the defect must be made use of. Shellac both wheel and pinion in a chuck of the lathe, open the hole in the pinion with a canon drill so that the pivots fall out, and insert a rimmer from one side into the hole. Fit a tempered steel rod into the hole, long enough to replace the lacking pivots, fasten it, polish the thus-formed pivots, and you have a new pinion.

Inspection of the Depthing.—The repairer must, when inspecting a depthing, take cognizance of five points: The entrance, the commencement of the driving, the play of tooth and leaf, the driving, and its ending. The entrance of the tooth must be free and with sufficient space between its back and the front side of the next leaf. The commencement of the driving, or the first contact of the tooth with the leaf must take place at the center line. The wheel must at each point of contact with the pinion, have a certain amount of shake. An equal development must take place by both the rubbing surfaces, no irregular motions must be visible, indicating badly formed teeth or leaves, leaves too large or too small, and depthings either too high or too low. The end of the driving should be carefully noticed if either a fall or a gliding takes place, caused by the specified faults.

Investigation of the Depthing by the Touch.—Press a sharply pointed cleaning stick upon one pivot end so that it turns with difficulty, and with another stick propel the driving wheel; the examiner then may ascertain, by repeating the operation for a few revolutions, if the driving is easy, without recoil or faulty friction. The necessary shake of the teeth is ascertained at the same time. To be certain, place the depthing in the tool, and satisfy yourself by ocular demonstration. After a certain amount of practice, the young beginner will acquire the necessary delicacy of touch to judge by touch alone whether any depthing is good or otherwise. It is only necessary in clocks to lightly press upon the pinion arbor while the wheel drives the pinion. It is to be recommended wherever possible to open holes to closely observe the depthing; an observation during the going of the watch offers the best assurance for its correctness.

Improvement of Depthing.—Faulty and irregularly formed wheels are either corrected, as far as practicable, or replaced by new ones. If the pinion is either too large or too small, and for reasons has to be retained, the depthing had better be placed shallow to obviate possible defects, especially a great drop; the depthing must be placed rather deep by too large a pinion.

To straighten a bent Pivot.—This can be done by a common pair of tweezers; or in a Jacot lathe bearing, pressing upon it with a dull burnishing file, while rotating the lathe, and polishing afterwards. Else make a small plate with graduated holes, find the fitting one for the pivot and spring it into shape, while holding wheel or pinion be-

tween your fingers; or it may be done by a small punch with a corresponding hole; care, however, must be taken not to overdo it.

REPAIRING THE SPRING BARREL.

The clickspring must not be too strong; the foot, beside the screw, should have a foot-pin to prevent it from moving upward, and out of depth, or downward to scratch and disfigure the barrel; the point of the tooth should enter firmly and reach down to the bottom of the ratchet wheel teeth, and be well formed to prevent a return of the click-work. The screw in the cap is the only one which I do not harden, evil consequences might follow an accidental breaking or snapping in the barrel bridge by a piece of screw; all others especially that of the stopwork and the small ones for the coverlid, must be hardened, heads and grooves made neatly and the pivots polished.

Closing up and bushing barrel holes.—The barrel must run straight and true, in well-fitting holes; if too large and at the same time not round, they had better be bushed with drilled bushings, turned upon an arbor, to suit. Great care especially in riveting, should be had, because by too violent a hammering, a change, a so-called "warping" may be produced, or the bottom may assume a funnel-shaped spring-form which cannot be corrected. The holes require sometimes an entire new bushing and centering, which is best done upon the Universal lathe.

Straightening the barrel.—A barrel which runs round and straight, stands sometimes obliquely when screwed in the bridge; the origin of the fault must be looked for in too much shake of the ratchet or too large a hole in the bridge, else in a defective turning out of the bridge; it may be remedied at times by screwing the bridge upon the plate, centering it from below, and making the turning out parallel to the plate, sinking at the same time that of the cap. If it is a barrel arbor standing free, with added ratchet, one or both holes of the outer arbor pivots require bushings.

Stop-work.—The end of the stopwheel screw should not protrude, be well-rounded, and end polished. The screwdend must not rub on the dial; the stopwork must be entirely secure, especially at the end by the adding of the full tooth. It is very useful to round off both parts, stopwheel and finger, from the lower side upon an arbor, with a small oilstone or a little emery paper fastened on a stick. The stopfinger should never touch its sink.

To be satisfied that the stopwork is secure, fasten the barrel arbor with the winding square in a pair of sliding tongs, pressing this with the three last fingers against the ball of the left thumb, while thumb and index finger encircle the tooth rim of the spring barrel and cause it to move to the right and left. During this motion endeavor to impart a contrary direction to the stopwheel, with a cleaning stick which you hold in the right hand, so that its points offers themselves to the stopfinger under the most unfavorable circumstances. If the stop-work act in a right way, it may be considered secure thereafter.

CLEANING A WATCH.

Remarks.—Whatever manner of cleaning may be made use of, whether washing in soapwater and rinsing in alcohol, whether benzine or sulphuric ether, never neglect to enter into the pivot holes with a sharply pointed cleaning stick.

Use an especially prepared brush to impart the first polish to the cleaned pieces, holding the watch-pieces between silk paper. It is well to cut down the hair or bristles from the point and heel of a new brush; brush first upon calcined bones, next upon a piece of stale bread, and finish upon clean paper, laying it over a sharp corner. While not using the brush, have it encased in a case of thick paper or pasteboard; brushes well-preserved in this manner are always ready for service.

Cleaning by washing.—Make use of Venetian soap, pure cocoanut soap, or a boiled preparation of soap-rot. Immerse all the watch parts in a vessel of hot water, dip the brush into it, draw it a few times over the soap, until there is sufficient foam, and take out one piece after the other with a brass tongs, wash it carefully, rinse it in cold water and throw it into a vessel containing alcohol. Take out the pieces, dry them in a fine linen cloth, and pass a soft brush over them. Polished pivots should be retouched before being washed with a leather buffstick and red. Parts of anchor watches and chronometers which are fastened with shellac, such as balance, arbor, etc., should be quickly withdrawn; the shellac might dissolve and the jewel become loose.

Cleaning with benzine.—This manner saves much time. The dismembered watch is placed in a suitable covered vessel containing benzine, which dissolves all the oil in a short time, the parts are taken out, dried in a clean linen cloth, and brushed with a clean, soft brush out, between silk paper. Not every benzine is suitable for cleaning; it is sometimes very dirty, and causes hard or resinous spots upon metallic surfaces, wherefore better try it first. A watch may be kept for several days in benzine. I have not found it advisable to also immerse the mainspring in it, and wish to record here that the springs have snapped shortly afterward; also quickly remove the balance spring. Springs are best cleaned by seizing hold at one end with a pair of flat tongs and draw them between a linen rag several times, without any violence, of course. It is not a very good cleaning fluid may be prepared of 90 parts purified benzine and to parts sulphuric ether. Some watchmakers prefer cleaning with ether altogether. I have never been able, however, to learn to like it.

Putting the watch together and placing it into its case.—When doing this remember four points: 1.—Keep from handling the same piece more than once. 2.—Seize it with tweezers or lightly with silk paper. 3.—Have it as short a time as possible between your fingers. 4.—The linen cloth used must not be fibrous. There are several sorts of paper which replace linen cloths with advantage.

The following is the routine pursued by many able watchmakers: Commence with the putting together of the barrel; put a little wax and oil between cap, ratchet and bridge; place the spring upon the spring-winder with a pin of exactly the diameter of the core, place the barrel upon it and lubricate both pivots with a little fine oil. Before doing this, satisfy yourself that the spring when being wound up, makes five and one-half turns, because if its tension would be times that owing to the hole for the stopfinger pin, its tension would not become sufficiently strong. Next screw the lower bridge (under the dial), and the escape bridge with the lower cap on the plate. Then, the fourth wheel and observe it well that it runs entirely free and with sufficient shake. Also the escape-wheel, observe if it stands straight, if the teeth are sufficiently far from the sinks in the bridge, and if the sink in the plate offers sufficient shake; quickly rotate the fourth wheel, holding the plate in all positions, to be satisfied that both wheels run entirely free.

After having located the balance bridge, put a little oil on both balance holes, at first only a small quantity, enter into the hole with a sharply pointed cleaning stick, that the oil may communicate with the cap jewels; then complete the necessary oil for the hole, also a little within the cylinder at the upper horizontal wheel hole, and locate the cylinder bridge together with the cylinder. Again inspect the movement, by laying a small piece of silk paper under the balance, and pass the escapement through; it is very necessary in flat watches or those with a small cut for the passage of the wheel in the oil, to be enabled to see if the wheel bottom reaches within the oil.

Put the barrel bridge in place; fasten the third and center wheel, lubricate the pivots of the latter with oil before putting it in, put in the center staff and cannon pinion, wind the spring a few teeth, while placing it, together with the boxwood ring upon which it was put together, to the ear. When putting in the centre staff, satisfy yourself that no cramping of the center-wheel is occasioned; very thin pivots are often found which are driven apart by the center-staff. Then put a little oil on all other pivots, place the movement in the well cleaned case and finish the putting together by mounting minute works, dial and hands (a drop of oil also is necessary for the minute pinion), and then begin regulating.

Care in adding oil.—The manner of lubricating with oil is of far greater importance than many watchmakers seem to think, and has a great influence upon the duration of a reliable rate.

Spring barrel.—It is not sufficient to also lubricate the spring, the bottom and cover of the barrel should also receive it. When putting it together, it is well before the cover is placed on, to put a little oil on the pivot which carries the cover, and the spreading it to the stopfinger and stopwork is obviated thereby.

Center wheel.—It is necessary before locating it, to put a little oil on the pivots so that it can sufficiently enter into the holes. The centre-staff also demands a trace.

Cylinder or escapement pivots.—Many watchmakers apply too much oil; they seem to think, when the wheel passes through each may take its share along; it is a reprehensible method, because the first ones receive so much that it runs down on the teeth and swims on the bottom, instead of remaining on the lifting surfaces of the teeth. Rather apply the oil but sparingly inside the cylinder, and add some to each third or fourth wheel-tooth.

The escapement pivots demand very little oil. They receive too much at times, especially those of the horizontal wheel. It enters into the pinion, spreads over the fourth wheel, and mixing with dust and dirt, soon wear down the pinion, while the pivots run dry.

Electro-Metallurgy—Silver Plating.

FOR electro-silver plating the double salt of silver and potassium cyanide is almost universally employed. The baths are used either hot or cold. The latter method is generally adopted for articles which require great solidity. The hot process is used for small articles, and is preferable for steel, iron, zinc, lead and tin, which have been previously electro-coppered. The hot baths are generally kept in enameled cast-iron kettles, and the articles are either suspended or moved constantly about in them. A somewhat energetic current is needed, especially when the articles are moved about in in order to operate rapidly. A gray or black deposit indicates too strong a current, and when the surface becomes covered with bubbles of gas the same thing is indicated. The anodes are plates of silver or heavy silver foil. The wooden tanks for the cold baths are similar to those used in plating with copper and nickel, but should be very thoroughly coated on the inside with gutta percha.

THE BATH.

Water (soft).....	1 gallon.
Cyanide of potassium (pure).....	8 ounces.
Nitrate of silver.....	5/4 "

Dissolve the nitrate of silver in a sufficient quantity of pure water (soft), and add to it gradually, with constant stirring, hydrocyanic (Prussic) acid until all the silver has been precipitated as cyanide, which may be known by the formation of no cloud in a portion of the clear liquid when a drop of the acid is added to it—avoid adding an excess of the acid. Throw the precipitate upon a fine cotton cloth filter, and as the liquid runs through wash the precipitate on the cloth several times with pure water. Dissolve the cyanide of potassium in the water, and stir in the cyanide of silver carefully removed from the cloth. If it does not dissolve in the liquid entirely, add more cyanide of potassium until it does, stirring continually. Let the impurities settle, and the bath is ready for use. Many electroplaters use a preliminary silver "whitening" bath, which is the same composition, but contains less silver, more cyanide, and is worked with a somewhat stronger current. The cleaned article in some cases is first dipped for a few moments in a solution of nitrate of mercury, one ounce in one gallon of water, and then in the whitening bath for a few minutes, and after brushing is transferred to the silver bath proper.

The vessels containing the cold bath are sufficiently high to allow about four inches of liquid above the immersed objects, whose distance from the bottom and sides should be nearly the same to give a regular deposit of metal at both ends of the object. The upper ledge of the trough carries two brass rods all around, which do not touch one another, one above the other, so that other metallic rods placed transversely will rest upon the higher or lower series of rods only. The upper rods are connected with the zinc, the lower with the carbon or copper end of the battery, or with the corresponding poles of the dynamo-electric machine. The transverse rods resting upon the lower set support the silver anodes; those resting on the upper set, the work. The work suspended from an upper transverse is placed so as to face two anodes suspended from two lower transverse rods. As the lower layers of the bath are apt to become denser (richer) than the upper, it is often necessary to reverse the articles during the operation to obtain a perfectly uniform thickness of deposit. For the same purpose small articles should be kept in motion as much as possible. The deposit is finer and denser if obtained with a weak battery and long exposure than if a strong current is employed. A sufficient quantity of silver may be deposited in three or four hours, but it will be of much finer quality and more easily burnished if the work is left in the bath for twelve or fifteen hours with a few cells of battery. When the articles, especially coppered iron, etc., have acquired a coherent film of silver, they are sometimes removed from the bath and thoroughly scratch-brushed, cleansed in alcohol, or preferably in a hot silvering bath, thence again passed through the mercurial solution and finished in the cold plating bath. The first scratch-brush-

ing, which is not always necessary, obviates the tendency of certain alloys to assume a crystalline appearance and corrects the imperfections of the cleansing in process. Should the anodes become black during the passage of the current, the solution contains too little cyanide. In this the deposit is adherent, but too slow; and the bath loses more silver than it can gain from the anodes. If the anodes remain white during the passage of the current, the bath contains an excess of cyanide, and the deposit does not properly adhere; correct by adding cyanide of silver until it dissolves with difficulty. When in good working order the anodes present a gray appearance while the current is passing, becoming white when the circuit is broken.

The specific gravity of the bath may vary from 5° to 15° Baume's hydrometer and still furnish good results.

Electro-silvering baths do not generally work so well when freshly prepared. If properly used and cared for they improve by age. At first the deposit is often granulated, bluish or yellowish.

It is customary to mix portions of an old bath with a freshly prepared one. Some platers introduce small quantities of ammonia instead to age the liquid.

Bisulphide of carbon in small quantities imparts a bright lustre to plated articles. An ounce of the bisulphide is put into a pint bottle filled with a strong solution of the cyanide of potassium and silver, briskly shaken, and a few drops of this liquid poured into the bath occasionally until the work appears sufficiently bright. An excess of bisulphide must, however, be avoided, as it will spoil the bath.

GOLD DEPOSITS.

In the practice of electro-plating with gold, the bath employed is usually heated, as the deposits obtained in such a bath are more homogeneous, tenacious, and durable, and of a better color, besides which recommendation a greater quantity of the metal may be deposited satisfactorily from it in a given time than from a cold bath.

Owing to the cost of the metal to be deposited very large surfaces are rarely required to be electro-plated, and as these baths become worn out and must be replaced by fresh solutions after a short time, they are usually, as a matter of economy and convenience, used in as small a vessel as the circumstances will admit of. These vessels may be of glass, porcelain, or porcelain-enameled iron. The latter serve the purpose admirably (if the enamel is good). They should be heated over the water bath of by means of steam.

The same bath does not answer very well for all metals—either the bath must be modified to suit the metal, or the latter must be previously coated with another metal to suit the conditions. Gold deposits are obtained with the greatest facility upon silver or copper, their rich alloys, or other metals coated with them. With these a hot bath (at about 170° F.) and a moderately strong current give good results. With alloys, such as German silver, the best results are obtained with a weak bath, barely warm. Steel and iron, when not coated with copper, require an intense current and a very hot bath. Lead, zinc, tin, antimony, and bismuth alloys of, or containing much of these, are preferably coated with copper before electro-gilding.

HOT BATHS.

For silver, copper, or alloys rich in these:

Distilled water	1 gallon.
Phosphate of soda, cryst.....	9 1/2 ounces.
Bisulphide of soda.....	1 1/2 "
Cyanide of potassium, pure.....	1/2 "
Gold chloride.....	160 grains.

Dissolve in a portion of the water, heated, the phosphate of soda. Dissolve in another portion of the water the bisulphide of soda and cyanide of potassium.

Dissolve the gold chloride in the remaining water, stir the solution slowly into the cold phosphate of soda solution, and finally add the solution of cyanide and bisulphide. The bath, now ready for use, should be colorless.

The cost of this bath is about \$5 a gallon, and the metal can be de-

posited from it profitably at \$2 per dwt. Used at a temperature of from 120° to 175° Fah.

BATH FOR IRON AND STEEL—UNCOATED.

Distilled water.....	1 gallon.
Phosphate of soda, cryst.....	7½ ounces.
Bisulphite of soda.....	2 "
Cyanide of potassium, pure.....	¾ drachm.
Gold chloride.....	160 grains.

Dissolve as before. Heat 175° or 180° Fah. Pass the second metal through the hot potash, then through dilute muriatic acid (acid 1, water 15), brush, and connect at once. Requires a very intense current at first.

The following baths work well with bronze and brass, but are not suited for direct gilding on iron or steel:

Distilled water.....	1 gallon.
Phosphate of soda, cryst.....	6½ ounces.
Bisulphite of soda.....	1½ "
Bicarbonate of potash.....	½ "
Caustic soda.....	½ "
Cyanide of potassium, pure.....	¾ "
Gold chloride.....	160 "

Dissolve all together, except the gold chloride, in the hot water: filter, cool, and gradually stir in the gold chloride dissolved in a little water. Heat from 120° to 140° Fah. for use. It requires an intense current.

Distilled water.....	1 gallon.
Ferrocyanide of potassium.....	5¼ ounces.
Carbonate of potash, pure.....	1¼ "
Salt ammoniac.....	¾ "
Gold chloride.....	160 "

Dissolve as in the last, boil for half an hour, replace the evaporated water, and the bath is ready for use.

Distilled water.....	1 gallon.
Cyanide of potassium.....	2½ ounces.
Gold chloride.....	160 "

Dissolve the gold chloride in the water, then add the cyanide, and stir until solution is complete.

Baths of this kind are commonly used, and with little regard to temperature. They are simple in preparation, but are, unfortunately, not very uniform in their working, ungilding one part while another is gilding, and producing a variety of colors, especially when freshly prepared. They improve by use, however.

COLD ELECTRO-GILDING BATH.

Water, distilled.....	1 gallon.
Potassium cyanide, pure.....	3½ ounces.
Gold chloride.....	160 "

Dissolve the cyanide in a part of the water, then gradually add the gold chloride dissolved in remainder. Boil for half an hour before using. (Use cold.)

The cold bath is kept in a gutta percha lined, wooden, or (if small) porcelain tank arranged as for brass plating. The anodes are thin plates of laminated gold, wholly suspended in the liquid (while in use) by means of platinum wires, from clean brass rods joined to the copper or carbon pole of the battery, the rods supporting the work being in connection with the zinc. When in proper working order the color of the deposit is yellow. If the deposit becomes black or dark red, add more cyanide (dissolved in water) to the bath, or use a weaker current.

If the cyanide is in excess the plating will proceed very slowly or not at all; or, as sometimes happens, articles already gilded will lose their gold. In such cases add a little more gold chloride or increase the intensity of the current.

Cold electro-gilding must be done slowly, and requires a good deal of attention to secure good work. The articles must be frequently examined to detect irregular deposits or dark spots (which must be scratch-brushed and returned). It is also frequently necessary to add to or remove an element from the battery, especially when adding or taking work from the bath. With too much intensity of current the deposit is black or red; if too weak those portions opposite the anode only get covered. In coating German silver it is necessary to use a

weak bath and a small exposure of anode. The best results with this alloy are obtained when the bath is slightly warmer.

MANAGEMENT OF THE HOT BATH.

The articles should be kept in agitation while in the bath. They should be placed in connection with the battery before or immediately upon entering the bath. A foil or wire of platinum is in many cases preferable to a soluble gold anode when electro-gilding by the aid of heat. It suffers no alteration in the liquid, and by its manipulation the color of the deposit may be materially altered. When it is removed so as to expose only a small surface in the bath, a pale yellow deposit may be obtained: when the immersion is greater, a clear yellow; with a still greater exposure, a red gold color. The strength of the hot baths may be maintained by successive additions of gold chloride with a proper proportion of the other salts and water; but it is preferable to wear out the bath entirely and prepare a new one, as it soon becomes contaminated with copper or silver if much of these metals have been gilt in it. In a nearly exhausted bath containing dissolved copper the electro deposit will be what is called "red gold," if it contains an excess of silver a "green gold" deposit will result.

The gold and copper or gold and silver are deposited together as an alloy, the color of which depends upon the relative proportion of the metals, battery strength, etc.

Dead lustre gilding is produced by the slow deposition of a considerable quantity of gold, by giving the metallic surface a dead lustre before gilding (by means of acids), by first preparing a coating of frosted silver, or by depositing the gold upon a heavy copper deposit produced with a weak current in a bath of copper sulphate.

In order to secure a good deposit of gold, it is absolutely necessary that the work should be freed from any trace of oxide, grease, oil, or other impurity. Articles of copper and brass may be cleansed by first immersing them in a strong boiling solution of caustic soda or soda, and, after rinsing, dipping momentarily in nitric acid and immediately rinsing, or scouring with pumice stone moistened with a strong solution of cyanide of potassium in water.

The bichromate battery is commonly used in connection with hot electro-gilding baths.

As gold chloride procured in the market cannot always be depended on for purity and strength, it is preferable to purchase the gold and make the chloride. A pure gold chloride may be prepared as follows:

Put coin gold, in small pieces, into a glass flask with about five times its weight of aqua regia (nitric acid 1, hydrochloric acid 3), and heat gently, with small additions of aqua regia if necessary, until the gold is dissolved and the silver remains behind as white chloride. Let it settle, decant the clear solution, wash the residue several times with water, adding the washings to the gold solution. Evaporate off excess of the acids in a porcelain dish over a water bath (nearly to dryness). Dilute with ten parts of water, and gradually add a strong aqueous solution (filtered) of sulphate of iron. Let stand until the dark powder (gold) settles; gently decant the liquid, wash the gold with hot water, and redissolve it in a small quantity of warm aqua regia and evaporate the solution, with constant stirring, to dryness in a porcelain dish over the water bath. One ounce of pure gold equals about 1½ ounce of this chloride.

CLEANSING AND PREPARING OBJECTS.

The first and most important operation in the electro-deposition of one metal upon another, is to effect a thorough chemical cleansing of the surface of the metal upon which the coating is to be deposited, for if this is not accomplished the deposited metal will not adhere to the surface.

In cleansing, different metals usually require a somewhat different treatment.

The surface of most metals when clean soon become coated with a film of oxide when exposed to the air, especially when the surface exposed is wet, and to avoid this it is usually necessary to proceed with the plating immediately after cleansing.

(To be continued.)

Reminiscences of an old Watchmaker.

THE following is a translation of an article in the *Notis Calendar* of Mr. M. GROSSMAN, written by this gentleman, who is no less renowned a horologist than a finished scholar and author; he may be classed among the thinkers in the horological art, as all those who have read his prize essay on "The Detached Lever Escapement," will cheerfully testify. But to our subject:—

While making a pleasure trip, in 1872, to Switzerland, I had the honor of becoming acquainted with Mr. Ingold. I am under obligations to his relative and successor, Mr. F. Bachschmid, for the following account of his stirring life, and deeming it not to be without interest, I am free to lay it before my readers.

M. G.

Mr. F. Ingold was born in Biel, Switzerland, in 1787, and lost his father at an early age. His most excellent mother, who understood watchmaking, instructed him, after the family had removed to Val-anuran, near Chaux-de-Fonds, and taught him the rudiments of the art. Her counsel, "whenever you can improve on a piece of work, do it," fell on fertile ground, and served as a guide during his whole future life. He became initiated into the mysteries of pinions, depth, verge, cylinder and other escapements, beside regulating, and in 1809 began his peregrination. Strassburg and Paris were the first places visited. He stood in danger of being drafted into the French army in 1813, and left Paris to go to America, in company with several comrades. When embarked at Dunkirk at 2 o'clock in the afternoon, they were made prisoners at 11 o'clock at night by the English and sent for several months to Dover and Portsmouth, as prisoners of war; they were released at last and shipped back to France. The remembrance of his journey on foot from Dunkirk to Paris causes even at this date the old man to laugh heartily; and I will state the reason in a few words. They were in the Normandy, where the travelers, five in number, applied to the mayor of a village for assistance. He invited them to dinner. The inhabitants of the room, beside the family, consisted of divers other two and four footed boarders, such as dogs, hogs, and chickens. The table service was unique of its kind. The table leaf was scooped out into basins which served in lieu of plates; knives and spoons were fastened by chains to each basin. These innovations in the eating arrangements already appeased the hunger of the travelers somewhat, but when the mayress broke and mixed the eggs in her leathern apron to cook omelettes, they were well satiated. The good dame, it is said, afterward expressed her astonishment at her guests, because they preferred eggs boiled in the shell to the *bonne bouche* omelettes.

He returned to Chaux de Fonds in 1815, and made a ladies' cylinder watch which was wound by turning the bezel, and the hands were set by a stem winding arrangement. Josephine, the first wife of Napoleon, wore it for some time, until it returned by accident into the possession of the manufacturer. Beside the historical interest, connected with it, it may be regarded as one of the first essays of making the stem serve for winding purposes. The next year found the excitable young man in London, but he soon returned to Paris, and went to work for the celebrated Breguet, and became fellow workman with Kessels and Nönet. His occupation was varied, and contributed much to his ability. His employer appears to have been satisfied with him, because he was sent in 1820 as head of the branch in Constantinople, whence he went in his honeymoon. His residence there was interrupted, however, by the revolt of the Greeks in the following year, and he was forced to return to Paris. He devoted his attention for the next few years to jewel work, and attained a remarkable dexterity therein; several of his pieces are in existence, among others a 10 leaf pinion of sapphire, testifying to his great ability. He next went back to Chaux de Fonds, where he privately taught pupils in jewelry work.

He returned to Paris in 1829, established himself in the Palais Royal, and became for the next succeeding ten years, one of the most renowned horologists of the metropolis; persons of the most exalted

rank favored him with their custom. He constructed several *Chefs-d'œuvres* during this period, which excited a great deal of attention. He built a regulator for the Palais Royal, a vase of flowers with singing birds, which sang each hour; a wizard who performed divers tricks to the delectation of an admiring audience, and several new escapements. His talent became famed to such a degree that even the celebrated astronomer Arago observed him, and at last proposed to him to organize a society for the elevation of the Parvesian watch industry. The society changed afterward into Ingold & Cie., and in 1840 removed to London, where they organized a firm entitled "British Watch Co." In his qualification as technical conductor of the concern, and fully comprehending the superiority of machine over hand labor, Mr. Ingold devised and constructed a great number of machines of such excellence that on the one side they caused universal admiration, while the other side entertained many not altogether groundless fears; the opposing parties stood in such numbers that when parliament was petitioned for a sanction there were two strong factions in the house. The final result proved disastrous; sanction was refused, and the business of the enterprise wound up. Mr. Ingold had embarked and lost his entire fortune in the venture, the fruit of many years' labor.

In 1845 he sought to better his fortunes, and came to New York, but was disappointed. There was no trace at that time of the present enormous watch industry of the United States, but it appears that the endeavors to prepare the ground for such an undertaking did not remain entirely fruitless; when after a residence of seven years, during which he lost his wife, he turned his face homewards, the Americans began their first essays at watch-making. Their machines to-day give evidence in many of their details of a relation with those constructed by Mr. Ingold.

He returned to Paris, and invented the cylinder-rounding machines for shaping wheel teeth epicycloid-form. He says that none of his numerous inventions has caused him as much study as this. The thorough knowledge of all known rounding methods, understanding their imperfections, added to which was the bad success of his enterprises, caused him to concentrate his whole force of thought upon the subject. He succeeded at last in recognizing the necessities of the depthings, and to discover the manner by which alone the true epicycloidal form is produced, namely, the rounding in a horizontal direction, by the assistance of fittingly formed leaves. His cutters underwent several changes before they assumed the present form.

Mr. Ingold removed from Paris to Chaux de Fonds in 1858, where he occupied himself with manufacturing his cutters until 1874, and then sold out to the writer of this article. He had lost both his children in America some ten years ago; but not all adversities in his enterprises, the great loss of his wife, the weight of his ninety years, could bend the man. As erect as a man of fifty, he possesses yet a clear eye and a bright understanding, and is best occupied when amidst machinery.

Aluminum Polish.

TO polish aluminum, M. Mouray recommends the use of an emulsion of equal parts of rum and olive oil, made by shaking these liquids together in a bottle. When a burnishing stone is used the peculiar black streaks first appearing should not cause vexation, since they do not injure the metal in the least, and may be removed with a woollen rag. The objects in question may also be brightened in potash lye, in which case, however, care must be taken not to make use of too strong a lye. For cleaning purposes benzole has been found best. Objects of aluminum can be electro-plated without the least difficulty, and Mouray succeeded in imparting to them a bright white lustre in passing them successively through a weak bath of hydrofluoric acid and aquafortis. The effect thus obtained is said to be quite surprising.

Business Notes.

F. C. Lawrence, late of Alamosa, Colorado, has removed to Chama, New Mexico.

H. W. Rubin's jewelry store at Smithport, Pa., was recently entered by burglars, who robbed his safe of some \$700 worth of jewelry.

Charles W. and George Henry Schumann, sons of Charles W. Schumann, of No. 24 John street, sailed for Europe in the Gallia March 2d.

Max Friedenthal, for several years with Albert Friedenthal, has been admitted into partnership. The firm will hereafter be known as Albert Friedenthal & Co.

John H. Starbuck has removed from Amherst, Mass., to Turner's Falls, where there is said to be an excellent opening for a skilled workman like Mr. Starbuck.

Joseph Fays has leased the building No. 38 Maiden Lane, which he proposes to thoroughly renovate and rehabilitate, previous to his occupancy of the same on the 1st of May.

S. Dessau, diamond importer, of this city, will sail for Europe on the 5th inst. in the steamship Arizona. He goes abroad for the purpose of purchasing goods in his line for the fall trade.

Mr. Joseph Stern, of the firm of May & Stern, No. 19 John street, who sailed for Europe in the latter part of February, is now visiting his friends in Germany, and is on the lookout for novelties in their line.

Tenner & Baum, after a business residence of nearly seventeen years at No. 1 Maiden Lane, have decided to seek more commodious quarters at No. 180 Broadway, with a view to extending their business.

Jacob Wiesner's jewelry store at Trenton, N. J., was burglarized last month. The thieves threw a brick through the show window and escaped with \$300 worth of goods. They are now in pursuit of the police.

E. G. Buckenham, senior partner of the old firm of Buckenham, Cole & Hall, will move from No. 10 to No. 41 Maiden Lane about the last of April, and will continue the importation of diamonds as before.

Welch & Miller, 169 Broadway, have assumed the agency for W. N. Walker's jewellers' cotton and twine. They will furnish the trade pink twine at \$1.50 per dozen, and pink and white cotton at \$1 per pound.

Among the latest novelties in charms is one just introduced by Leroy W. Fairchild. It is a pencil case, and represents a chicken coming out of an egg. It is made in silver, with gold ornamentation, satin finish. It is unique both in design and workmanship, and just the thing for Easter.

Mr. C. Billings, of the firm of Randel, Baremore & Billings, sailed for Europe in the Gallia on March 2. He visits the branch house in London for the purpose of making purchases for the American fall and winter trade.

M. D. Rothschild, for several years with L. & M. Kahn, has been admitted to an interest in the stone department of this firm. Mr. Rothschild sailed for Europe in the Britanic, March 12th, in search of novelties in his line.

Charles Wendell & Son, of Chicago, have removed to the building adjoining their present place of business, No. 172 State street, where they have fitted up a very neat store, which will be filled with a desirable stock of goods.

In the advertisement of Kearney & Swarthchild, that appeared in a late issue of THE CIRCULAR, in speaking of the attachments that go with their lathes, the types made us say five split chucks when the number should have been fifteen.

C. H. Knights of Chicago, are among the most enterprising, go-ahead jewelers of that city. They have the contract of special-named watch movements that are made expressly for them, which they are now pushing with their characteristic vigor.

David J. Ayres, of T. R. J. Ayres & Sons, Keokuk, Iowa, has been in town and bought liberally for the spring trade. He takes home with him a large and carefully selected stock of novelties with which to capture his fellow townsmen, also townswomen.

J. Aaron, a small dealer in Brooklyn, has failed, having made an assignment to G. De Lava. He had contrived to get a limited amount of credit from his victims now mourn their loss.

The advertisements of Kossoff Marx & Co., to be found on other pages of this issue of THE CIRCULAR, are not only characteristic of their enterprise, but indicate that they are going extensively into fine goods. Attention is called to their stock of diamond goods, watches, chains, etc.

Cross & Beguelin, of this city, have been appointed the sole agents in this country for the watches made by J. Alfred Jurgensen and Charles E. Jacot. These goods enjoy an enviable reputation as time-keepers, and embrace every variety of fine and complicated watches.

Mr. Louis Neresheimer, brother of E. August Neresheimer, the well known importer of diamonds, was married on the evening of March 28, to Miss Adele Jantzen, daughter of Mr. and Mrs. Joseph Jantzen, of New York. The groom and his fair bride will sail for Europe on the 2d inst.

It is reported that Howard Bros. are to establish a watch factory at Fredonia, N. Y., for which \$200,000 capital is desired. Rumor has it that one-half this amount has already been subscribed, but it is not stated whether or not in the watch factory plant their patent eye-saw is to be included.

Mr. Herman Levison, of Levison Bros., of San Francisco, has returned from Europe, and has rejoined the hearts of manufacturers in this city with his usual liberal purchases. He possesses exquisite taste, buys with rare discrimination, and is noted for being one of the largest buyers in the country.

The firm of D. M. Fitch & Co., New York, was dissolved by limitation March 1, Mr. Samuel L. Howland retiring. The firm now consists of D. M. Fitch, Charles S. Fitch and Smith A. Harriman, and will be conducted under the old firm name of D. M. Fitch & Co. May 1 the firm will remove from 15 John street to the Meriden Britannia Company's building, at Union Square.

Celluloid jewelry is coming into renewed popularity, owing to the enterprise and skill displayed by manufacturers in bringing out new and artistic designs. The trade does not fully appreciate the extent to which this material is being introduced, nor the variety of forms it takes on. The Celluloid Novelty Company alone turns out an average of eleven thousand pieces a day. Some of the special work is excellent in design and beautiful in workmanship.

W. B. Clapp & Co., of Chicago, at 170 State street, have just displayed upon their building one of the largest and most elaborate signs in that city. It is 130 feet long by 5½ feet wide, elaborately carved and gilded, bearing the name "W. B. Clapp & Co., wholesale jewellers," in iron letters, three feet high, beautifully inlaid and ornamented with dark and lemon gold. It is not only an elaborate advertisement, but is in itself a work of art, a fitting introduction to the energy and enterprise within.

Mr. Thomas G. Brown has admitted to partnership with him his two sons, William A. and Thomas B. Brown, both of whom have been educated in the office of their father in the proper way for a jewelry manufacturer to go. The firm will hereafter be known as Thomas G. Brown & Sons. After many years of laborious service in the jewelry interest, and having built up for himself an enviable reputation in the trade, Mr. Brown, Sr., now proposes to seek rest and recreation abroad. He sailed for Europe on March 31, in the steamship Republic. The best wishes of the trade go with him.

Tiffany & Co. have nearly completed the magnificent punch bowl which is intended for presentation to General W. J. Palmer, president of the Denver and Rio Grande Railroad. It is of solid beaten gold, about fifteen inches in diameter, and ten inches in height. The material is fourteen karats fine, and the artistic work is regarded as excelling anything attempted on any article of the kind in America. On one face is a fine representation of a buffalo hunt on the plains, in *repousse* work in high relief. It contains a number of unusually well executed figures. On the other face is an inscription complimentary to General Palmer and his management of the Denver and Rio Grande Railroad. It is presented by the English stockholders in the railroad of which General Palmer is president, and costs \$2,500.

The Spencer Optical Manufacturing Company is about to issue a work of great value to dealers in optical goods. Very few jewelers who handle eye-glasses and spectacles are sufficiently familiar with diseases of the eye, or its numerous peculiarities, to enable them to adjust glasses satisfactorily to their customers. Books that have been printed on the subject are written too much from a medical standpoint, and are too technical to be of value to the ordinary salesman of optical goods. The Spencer Company, to meet the difficulty alluded to, have prepared a book of information regarding difficulties with the eye, that is made up of plain, practical instructions, easily comprehended by any one, that will enable dealers in optical goods to treat their patrons intelligently, and furnish them with glasses that are adapted to their peculiar difficulty. Such a work will be of great value to the trade, and of even greater value to the public.

Trade Gossip.

The watch and trinkets continue to be suspended by a chataleine from the waist or belt.

Separable sleeve-buttons are now sold by street hawkers in this city at five cents a pair, and are more ornamental than useful. It has not sold the time in many months.

The West Farms' town clock is more ornamental than useful. It has not sold the time in many months.

Semi-precious and imitation jewels and gems play an important part in spring and summer dress effects.

The latest novelty in jewelry is the "Charmeuse" necklace, made of ball fringe, both gold and silver.

A filigree rose, with the centre of crystals, on delicate filigree stems, is a beautiful decoration for the hair.

Miles W. Evans, formerly with the Duerber Watch Case Company, has entered the employment of Hagstoz & Thorpe.

It is estimated that there is 100,000 commercial travelers in the United States, and still the anxious state is not full.

A horned owl, with ruby or diamond eyes, perched on a golden crescent, is the latest design for a gentleman's scarf pin.

Seven thousand pianos, costing \$2,200,000, and 15,000 organs, worth \$1,250,000, were sold in Chicago in 1880. Who says Chicago is not a musical city?

One of our friends on the road writes us that an ordinance against profanity is rigidly enforced in Avon, Ill. A plain "damn" brings a fine of \$3.00, and fancy swearing costs more.

The Iowa Retail Jewelers Protective Association met at Ottumwa March 16. There was a good attendance, and an earnest interest manifested in the work of the Association. We regret that the Secretary did not send us the detailed report of the proceedings in time to print in this issue of THE CIRCULAR.

The spring burglars commenced prosecuting their operations upon jewelry stores quite early this year, following close upon the heels of the winter operations in this line. Several burglaries in the city were reported last month, in which stocks were well weeded out. As usual the thieves are trying to find a policeman.

An enterprising manufacturer of optical instruments in Berlin shows his appreciation of the wide-spread excitement about infected pork in Germany by advertising microscopes for sale at a popular price, with specimens of trichine prepared for examination, and full directions for detecting the presence of parasites in meat of any kind.

Thomas S. Tice, of Brooklyn, has made an assignment with preferences to his brother of \$26,080, and \$5,000 to his bank of deposit. His liabilities are stated at \$53,000; assets \$49,000. Mr. Tice's failure was a great surprise to the trade, and comments upon it, not at all flattering to Mr. Tice, are freely indulged in, as it was supposed that his credit was strongly backed by good real estate security.

The death is announced of H. C. Tyler, of Yazoo City, Mississippi. Mr. Tyler was born in Boston, Mass., but had been in the jewelry business at Yazoo City for thirty years. He held a high place in the estimation of his fellow citizens, being a man of excellent moral, social and business character. He left a widow and six children, who are comfortably provided for. The business he established will be carried on as usual.

Charles S. Massey, of Allentown, Pa., died March 12th, in the 64th year of his age. Mr. Massey was apprenticed to the watch-making business when he was eleven years of age, and before he was twenty he had established himself at Allentown as a jeweler and watchmaker. He was an excellent workman, an esteemed citizen, and one who was beloved by all with whom he came in contact. Mr. Massey enjoyed the confidence of the trade in a high degree, and his decease excites general regret.

It is reported that a movement is on foot to establish a watch company at Cincinnati. The reason assigned for desiring another factory is that those now in existence are overrun with work, and are behind with their orders. While this is true, the fact seems to be overlooked that for years, during the dull times, these factories had much less than they could do, and were running at a loss all the time. A watch company may be a good thing to have when business is "booming," but in dull times it is even a more costly luxury than a newspaper. But there are gauds in every pool and fools in every town, so it is not improbable that Cincinnati and a dozen other places contemplate establishing watch companies. By the time half the necessary capital is subscribed, however, these schemes will be abandoned, or whenever the practical business men interested come to count the cost.

Not long ago, says the New Orleans *Times*, a New Orleans drummer was sent to a town in Mississippi to look into the affairs of a merchant who had failed, and who was largely in debt to the establishment he represented. "Mr. Hoffenstein," he said, "how much do you propose to pay on the dollar?" "Vell," replied the merchant, "times is pad you know, and pishness was dull, but—," he continued, touching his nose, "I'll pay shut as much as der rest. How much is der poy paying dis year, anyhow?"

Advices from Europe indicate a material advance in the price of diamonds, in consequence of the unusually large demand, which renders it impossible for the cutters and polishers in Amsterdam and elsewhere to keep up with their orders. The cutters and polishers try to keep their art to themselves, being loathe to take apprentices or teach it to any one. This is an absurdity, and will result in their losing their trade. Already America has a number of cutters and polishers whose work is superior to that of the European workmen, and the number of "natives" learning the business is increasing each year.

Since the Jewelers' League column was put into type, it has transpired that the pressure brought to bear upon the Assembly of the State of New York by the united efforts of the mutual benefit societies through the Union referred to, has induced the "Bald Eagle of Westchester,"—as Mr. Husted, the manager of the adverse legislation, is dubbed,—to himself move that the bill be recommitted to the Insurance Committee, with instructions to strike out the insuring clause, and without any excitement the bill was converted into waste paper. Thus endeth the second effort to trammel the operations of benevolent societies by the insurance interest in this State.

There is frequent complaint regarding a class of unscrupulous jobbers who are encouraging the manufacture of a cheap class of plated chains and jewelry in imitation of the best gold and fine rolled plate goods. The spurious chains are so debased that there is very little gold in them, and they are wholly unserviceable for practical use. Manufacturers who have established reputations for the excellent quality of their goods, have well-known trade marks, and, in some instances, these have been imitated by the manufacturers of the spurious goods. It is safe to say that the jobbers know the difference in the goods and the trade marks, and when they handle the spurious goods they become parties to a deliberate swindle upon the public. There is reason to believe that vigorous efforts will be made to bring some of these unscrupulous jobbers to a realization of the fact that such business cannot be done with impunity. There is no objection to cheap goods in the abstract, any more than there is to lead or soft solder—it is only when they are palmed off as gold goods, made by well-known manufacturers, that the transaction becomes a fraud, of which our criminal code will take cognizance if appealed to.

While most of our traveling men, our commercial tourists in the jewelry trade, are nice Christian gentlemen, there is occasionally one who is as full of Old Nick as an egg at this time of the year is full of malaria. There was one of these stopped at a country town a few nights ago where there was a church fair. He is a blonde, good-natured looking, serious talking chap, and having stopped at that town every month for a dozen years, every body knows him. He always chips in toward a collection, a wake or a rooster fight, and the town swears by him. He attended the fair and a jolly little sister of the church, a married lady, took him by the hand and led him through green fields, where the girls sold him ten-cent chances in sawdust dols and beside still waters where a girl sold him sweetened water with a sour stomach for lemonade, from Rebecca's well. The sister finally stood beside him while the deacon was reading off numbers. They were drawing a quilt, and as the numbers were drawn, all were anxious to know who drew it. Finally, after several numbers came out, it was announced that No. 15 drew the quilt, and the little sister turned to the traveling man and said: "My, that is my number. I have drawn it. What shall I do?" "Hold up your ticket and shout 'keno,'" said he. The little deaconess did not stop to think that there might be a quile lurking in that traveling man, but full of joy at drawing the quilt and ice cream, because the traveling man bought it, she rushed into the crowd toward the deacon, holding her number and shouted so they could hear her all over the house, "Keno!" If a bank had burst in the building there couldn't have been so much astonishment. The deacon turned pale and looked at the poor little sister as if she had fallen from grace, and all the church people looked at her sadly, while the worldly minded people snickered. The little woman saw that she had got her foot on something, and she blushed and backed out and asked the traveling man what he thought. He said he didn't know exactly, but he had always seen people when they won anything at the game yell "keno." She is not exactly clear yet what keno is, but she says she has sworn off on taking advice from pious looking traveling men. They call her little keno now.

THE

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THE

JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

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AGENTS:

PRATT & CO., 98 Arch Street, Philadelphia, Pa.

CHANDLER & SHADER, 57 Washington Street, Chicago, Ill.

Why There are So Many Failures.

THERE have recently been numerous failures among retail dealers, resulting in serious loss to the trade. Some of these have been legitimate failures, resulting from the dealer being disappointed as to the winter's trade, and overstocking himself with goods, many of them of a better class than were required by his patrons. Other failures have a great amount of crookedness about them, were unquestionably premeditated and carried through solely for the purpose of victimizing the trade. There is no industry in the country that is so lenient and forbearing as the jewelry trade. Its patience under long suffering and infamous treatment would, if it were an individual, entitle it to be canonized as a modern Saint. It can stand more positive abuse and barefaced swindling without manifesting any resentment than individuals in any other calling would submit to. Unfortunately the apathy of the trade while being victimized is not in the interests of good business morals. It induces dealers with loose ideas of business to become positive swindlers, whereas, if the trade would assert its rights vigorously, such men would be kept in the paths of business rectitude. It treats altogether too leniently with dealers who have acquired a habit of failing, and is too willing to compromise the most flagrant cases of wrong doing. There are certain manufacturers to whom the present dollar in hand takes precedence of the welfare of the trade or business rectitude. They would rather compromise with a fraudulent debtor for twenty cents on the dollar, than to join with his other victims in prosecuting him, and securing for him such punishment as would deter others from similar practices. It has got to that point that when a dealer comes to New York to announce his embarrassment, he is forthwith seized upon by this gang of harpies, hurried over to the Astor House, and a compromise agreed upon for such an amount as he can pay in cash. "The gang" engineer the entire business for him and if a reputable creditor shows a disposition to hold out, and insist upon more stringent measures, he is harried and worried until he is eventually glad to accept the terms proposed. Then these harpies who

have so befriended the debtor in his troubles, cling to him till they have sold him another stock of goods. They argue that after having settled with all creditors for a few cents on the dollar, he is ready to start again with a clean bill of health, and will be good pay for two or three years at least, during which time they will enjoy a monopoly of his trade. They care nothing for the general effect of such compromises upon the retail trade; how it demoralizes those who expect to pay 100 cents on the dollar to have one turned loose among them who only pays 20 or 30 cents; nor how the success of these cheap compromises is a standing temptation to others to adopt the same plan; the morality of the transaction is entirely overlooked by these avaricious creditors in their greediness to get the present dollar, which is larger in their eyes than the starboard wheel of the Great Eastern and to "make themselves solid" for future orders. Some recent compromises have been positively disgraceful to the trade, and an insult to the intelligence of the men who consented to them. Every compromise made wherein there is the slightest tincture of fraud, is a bid for more rascality. When Jones can settle all his indebtedness for twenty cents on the dollar, and immediately get a new stock of fresh goods on credit, why should his competitor, Brown, struggle on with an old stock of *passed* goods in the hope of paying his creditors in full, and preserving his reputation as an honorable man? He sees that Jones not only has a decided advantage over him in stock, but that he stands quite as well with the trade, his credit is as good as it was before he failed, and his new stock is attracting all the custom. So Brown puts up his shutters, comes to New York and follows the example set by Jones. Of course, this is an extreme illustration, for the majority of dealers are jealous of their reputations, and will strain every nerve to meet their obligations; but we have been informed many times by dealers that they are frequently discouraged by the leniency shown others whose failures they know to have been conceived in iniquity and accouched in fraud. Unscrupulous dealers, contemplating failure, work down their stocks at ruinous prices, betting a competition which the honest dealer cannot follow. Trade is demoralized, and the reputations of the dealers suffer in their own community. A few criminal prosecutions instead of cheap compromises would do a vast amount of good in purifying the atmosphere that surrounds the trade.

While creditors are largely to blame for the great number of failures in the trade, dealers themselves are often responsible for their lack of success. Very few of them are trained merchants, and are lacking in those business methods and habits that are essential to success. Graduates from the workshop, where they have shown skill as workmen, and being ambitious to push forward in the trade, they have started out for themselves with but faint ideas of the requirements necessary to make a successful merchant. The knowledge they should have gained by a course of training in the counting house, to make of them good salesmen and business managers, they must acquire, if they ever do, through the costly channels of every day competition. Their training has not been of a character to compel them to figure closely on expenses, or to comprehend the close relations that exist between profit and loss. They do not know how to buy goods for the trade they cater to, and are liable to be overstocked with unsalable goods. Few of them understand the rudiments of book-keeping, their

accounts are kept in a loose manner, collections are neglected, and credit extended promiscuously. Such men seldom know their financial condition, and, finally, when there are no funds to meet maturing obligations, they are amazed to find that they are bankrupt. Dealers of this class are not to be ranked with the unprincipled sharpers, who fail as a matter of business and make a profit by it, but they are to be blamed for not securing a business training before attempting to conduct a business on their own account. They would laugh at a man who should attempt to repair a watch without first having learned the watchmaker's trade, yet they have the hardihood to take up the business of a merchant without having qualified for it. Every workman who contemplates dealing on his own account, should spend two or three years in the counting room of some successful dealer who has a reputation for understanding the ways of trade. Such a business education as they would there obtain would enable them to steer clear of many of the rocks on which so many of them have been wrecked.

For this class of dealers, who are misled into attempting that for which they are not qualified—instigated thereto frequently by dealers ambitious to add them to their list of customers—we have much sympathy; but for the other class to which we have referred, those unscrupulous men who fail with the deliberate purpose of victimizing their creditors, we entertain such sympathy as would land them in State Prison if the law's possibilities would permit of it. There are numbers of dealers to-day doing business, who have compromised with their creditors for a paltry pittance, and again obtained credit from them, who are chuckling in their sleeves at the credulity of the men they have deceived, and who are waiting for the propitious time to arrive when they can repeat the operation, thereby accumulating a competence with which to retire from further contention with an evil disposed world.

The Retail Trade.

THE jewelry business is one that has special attractions for outsiders. A person having a small amount of capital, and desiring to engage in some clean, pleasant business, casts a longing eye towards the jewelry trade, and thinks he would like to engage in it. Hence, there are many retail dealers in the trade who were not bred to it, and who are not, consequently, specially qualified to make a success of it. Another class consists of practical workmen who, having an ambition to get into business for themselves, set up as jewelers and repairers in some small place, and are surprised if success does not immediately come to them. The great trouble with both these classes is that they are not trained business men, and are not able to compete with their more shrewd rivals. Finding that they do not get as much trade as they think they should have, they commence cutting prices, and soon a strong and bitter rivalry springs up between them and their competitors. In their animosity towards each other, and their sullen determination to get business at any price, they are apt to lose sight of the cost price of their goods, their maturing obligations, and the difference between profit and loss. Meantime, while the suicidal fight progresses, the combatants and their families must live, rent must be paid, and the daily receipts are consumed in daily expenses, so that when the notes given for stock fall due there are no funds saved up to meet them with—result, failure, and an offer to compromise with creditors. Manufacturers and jobbers have become familiar with this style of warfare between retailers, and when the time comes to look for assets, they are not surprised to find that most of them have been squandered in the vain struggle to prove that there is a profit in selling goods below cost. A man may be a most skilful workman, but an utter failure either as a salesman or a business manager. Attempting to prosecute business in spite of this lack of training, he is apt to commit follies that a shrewd business man would avoid. We are glad to see an honorable ambition that leads a workman to better his condition, but when he launches out for himself he should be very guarded in all matters that he does not understand, and bear in mind that all unexplored paths are beset with danger. Unreasonable competition is one of the

greatest perils surrounding the retail trade, and is one of the most fruitful causes of failure. Unless a fair margin of profit is maintained at all times, and due allowance made for living expenses, rent, etc., there must inevitably come a crash, in which debtor and creditor are sure to be overwhelmed.

But the retail dealers' competitors, unfortunately, are not all found within the trade. Of late years, dry goods merchants, druggists, dealers in gentlemen's furnishing goods, and other enterprising caterers to the wants of the public, have taken to laying in stocks of certain kinds of jewelry, which they sell at low rates for the purpose of attracting trade. Jobbers are much to blame for this, and have been very justly censured for selling goods to outsiders at the same prices they sell to the regular trade. These outsiders can afford to undersell the regular dealers, for they do not depend upon these goods for a profit; they simply use them to attract attention to their legitimate stock, just as dry goods merchants in this city will advertise at times certain standard goods below cost. It attracts customers, and they trust their ingenuity to hold on to a customer when once he comes within their doors. Jewelers have nothing of this kind to fall back upon, for there are very few lines of goods that could be profitably handled with jewelry. Dealers must rely upon their legitimate stocks for their profits, and, of course, cannot compete with those who sell at cost merely as an advertisement. Since the organization of so many State associations of retail dealers to protest against this unfair treatment by the jobbers, the evil has assumed less magnitude, but it is still one of the greatest obstacles to the success of the retail trade. Manufacturers and jobbers, who must rely upon the retailers for the sale of the goods they make and handle, should, as a matter of self preservation, do all in their power to protect the dealers, and refuse to sell goods to outsiders, except at retail prices. In this way only can the dry goods merchant, the druggist, the barber, *et hoc genus omne*, be prevented from undercutting in prices and so injuring the trade of the retail jewelers. In response to the protests of the State associations, the practice formerly in vogue among some of the jobbers, of sending catalogues and price lists to outsiders, and offering to sell goods by retail at wholesale prices, has been pretty much abandoned; now if they will discontinue selling to outside dealers at wholesale prices, the retail jewelers will have not only a fair chance to make a living, but a good opportunity to provide for their maturing obligations.

Life Insurance and Benevolent Societies.

THE life insurance companies attempted again last winter to secure legislation at Albany hostile to benevolent societies, like the Jeweler's League. Mr. Husted was persuaded by the Insurance Department to introduce a bill prohibiting any association organized in another state, doing a life insurance business, prosecuting such business without complying with the insurance laws. This would necessitate the deposit, by each society, of \$100,000 with the Insurance Department, the maintaining of a reserve fund to meet all prospective death claims, and the making of annual statements to the Insurance Superintendent. It would, in fact, kill off all benevolent societies that pay any sort of benefits to heirs of deceased members. While the bill was ostensibly directed against societies of other states, it was felt that it was but an entering wedge to be followed by similar legislation to apply to societies of this state. Even had it become a law as it stood, it would have prevented numerous benevolent societies doing business in this state, notably some of the Masonic and Odd Fellows societies, the benevolent organization of railroad engineers and conductors, and many similar societies, that have been chartered by other states, but whose membership extends all over the country. The benevolent societies at once took the alarm, and, through the agency of their various branches all over the state, brought such influence to bear on our legislators as to cause a general stampede among them when the bill came up for consideration. Mr. Husted, the veteran leader, was the first to take the back track, and asked the legislature to kill the bill he had introduced, which

was promptly done, and the affair was supposed to be ended. But next day the legislature "slopped over" quite as much in the other direction. Mr. Duguid introduced a bill to exempt all associations that pay benefits to the heirs of deceased members by means of assessments on living members, from the operations of the insurance laws. This bill was rushed through both houses with indecent haste, but was, fortunately, vetoed by the Governor. The effect of this measure, had it become a law, would have been to throw wide open the door, and invite all the swindling co-operative associations in the country to come here and prosecute their deceptive schemes. Pennsylvania and Ohio, and some of the more westerly states, have been devastated by this class of companies, pretending to deal in life insurance, but simply swindling the people. Their plan of operations is to get members to pay a liberal admission fee and one year's dues in advance, and agree to pay assessments whenever a member dies. The sums realized by the advance payments and five or ten per cent. of the amount collected by assessment, is applied to paying expenses, the expenses being the salaries of officers and commissions to agents. It is to the interest of the officers to admit old and decrepit persons to membership, for the more deaths, the more money for them. Recently it has been discovered that in Pennsylvania, gangs of speculators have been making lots of money by insuring the lives of old paupers from 70 to 85 years of age, sick, bedridden, and almost ready to put in their graves, for large sums in different co-operative companies. In some instances it is known that the officers of the companies were in collusion with the speculators. Some of these old and dying persons were insured for \$100,000 and upwards. When they died, the living members of the companies in which they were insured, were assessed to pay the death claims, the officers retaining their percentage. Companies of this class, that make a business of dealing in assessment insurance, are not to be compared with the benevolent societies organized within the different trades and industrial callings, and maintained solely for a benevolent purpose. Unfortunately, the life insurance companies make no distinction between the purely benevolent societies and the assessment companies that are organized by sharpers and run for their own personal advantage. Such companies are enemies of the whole people, and as antagonistic to the benevolent societies as to the regular life companies. But the latter, in seeking to procure legislation to check the operations of these swindling concerns, have not observed the distinction that exists between them and the benevolent societies, and, consequently, the latter, in order to protect themselves from hostile legislation, have been forced to join hands with the co-operative companies. This is unfortunate, for it places the benevolent societies in a false position, making them appear as endorsing the fraudulent schemes of designing men. The fault lies with the regular insurance companies that, while seeking to put an end to swindling, so word their bills as to make them apply to benevolent societies.

The fact is, these benevolent organizations have done too much good, and have become too popular with all classes, to be lightly brushed aside by the life insurance companies. The latter may have money enough to control legislation on most points affecting their welfare, but the benevolent societies can outvote them at the polls, and our legislators realize that fact. Consequently, the life companies never will make headway in tramping out the co-operative evil so long as they include the benevolent societies as a part of that evil. There is as much difference in the methods and motives that govern the two classes of societies as there is between good and evil. The benevolent societies are charitable and beneficent institutions; they are organized within certain trades or callings for the benefit of the members of such trades or callings; they do not solicit the general public to become members; they do not derive a profit from the business; they simply seek to improve the moral and social condition of their fellow-craftsmen, and to care for the widows and orphans of those that may die. The death of a member with them means an expense to each other member, an expense cheerfully incurred because of the bond of sympathy that exists in all such societies; in the co-opera-

tive societies, a death means increased emoluments to the officers.

The Jewelers' League is a fair illustration of the methods by which these benevolent societies are conducted. Its membership includes several hundreds of the best men in the trade, from millionaire proprietors to salaried clerks and workmen in all branches. The annual dues and surplus funds derived from interest and advance assessments, constitute a reserve fund, with which to meet death claims if necessary. A strict medical examination is required before a person can be admitted to membership, and the extreme age at which one can join is 45 years. The League makes assessments in advance, so it always has funds on hand with which to pay promptly a death claim. All the officers serve without compensation, except the Secretary, who is allowed sufficient to pay for postage, stationery and printing. The League is now in a flourishing condition, having a large membership, with additions daily. Its officers are entitled to great credit for the unselfish manner in which they have labored so long and so arduously. It would be a great piece of injustice for our legislature to say that the League, and kindred benevolent societies, should be subjected to the same laws that govern the regular life companies, that are conducted for gain, and whose officers derive princely salaries from them. The people, fortunately, have some rights left yet which even legislators are bound to respect, and among these is the right to organize and maintain benevolent and charitable societies for their special benefit. Our legislators learned this winter that this is a right the people do not mean to be deprived of at the instigation of parties interested in conducting business as a kindred nature for profit.

WE regret to announce that the series of articles under the heading "Hints on Watch Repairing," by "Excelsior," are temporarily suspended on account of the ill health of the author of them. "Excelsior" is, unquestionably, one of the best informed watchmakers in the country, and his present ill health, combining a variety of serious physical disorders, is the result of his studious habits. Not only has he devoted his time to storing his mind with watchmaking lore, analyzing the best thoughts of the best writers on the subject, but he has reduced the theories advanced by them to practical application before giving them the endorsement of his approval in our columns. "Excelsior" has been an overworked man for a number of years, because he has put his conscience into his work, and is now suffering because he has done too much. The fact of his illness having been noised abroad throughout the trade, we have received numerous letters from practical watchmakers, condoling with him in his illness, expressing the greatest admiration for his ability as a profound writer on a technical subject, and expressing the hope that his speedy recovery will enable him to recommence his valuable articles at no distant day. These evidences of appreciation are a just tribute to the ability of "Excelsior," and his gratitude for them cannot be expressed in words. Through us he thanks the trade for its sympathy in his affliction, and assures them that when health is restored, he will endeavor to recompense them by resuming his articles. We have every reason to believe that his illness will be but temporary; that rest and care will soon restore him to health, and that his old familiar discourses will, ere long, again grace the columns of THE CIRCULAR.

THERE is an epidemic going the rounds of the country just now for the organization of watch companies. It breaks out every few years, rages for a time, and disappears. Its first appearance on the present occasion caught the originators of the trade watch company scheme, who had a severe attack of it, and went so far as to propose forming a sort of co-operative watch company among the retail dealers, they to furnish the money and the officers to spend it. This scheme got as far as a prospectus, and there it hangs. The next victim of the disease is attacked even more severely. His plan is to locate a watch company in some western town, get the town to subscribe \$50,000 towards the scheme, and to make up the little bal-

ance required by getting a thousand retail dealers to subscribe \$200 each. As an inducement to them to subscribe, he offers to sell them watches made by the prospective company ten per cent. less than they will be sold to others. If there are a thousand idiots in the trade, he will probably succeed in this self-glorifying scheme, and the proposed company will, no doubt, be a great success. There are also several other victims of the epidemic at large, one of whom proposes to organize a company in Cincinnati, and another promises to combine the business of making watches and eye salve. All these schemes seem plausible and hold out promises of great success—to their originators. The projectors forget the fate of the United States Watch Company, started under the most favorable auspices, the Cornell company, and several others, whose precarious existence and pecuniary entanglements gave fresh illustration to the old adage "the fools are not all dead yet." If these visionary men will only wait patiently a short time, they will have an opportunity to buy some of the existing watch companies very cheap. True, these are doing a good business just now, but there is a limit to the demand for watches. Every nation and all people are now well equipped with watches, except the Boers and the Zulus; as soon as they are supplied, the demand will cease, and half a dozen or more companies will be for sale. Evidently, our old friend Aristarchus Plumbago has been going about the country like a rabid dog, and has inoculated these innocent gentlemen with the virus of the watch making disease.

The Illinois Retail Jewelers' Association.

THIS Association held their Annual Meeting at the Leland House in Springfield, on the 6th of April, John L. King of Jacksonville in the chair. The attendance was good and unusual interest manifested in the proceedings. Numerous speeches were made and a full interchange of ideas took place. It was apparent to all that the organization had been of great benefit in the past, and promised to be still more so in the future. A resolution commending the JEWELERS' CIRCULAR for its fearless and outspoken opinions upon abuses of the trade, and its firm and undeviating positions of vital import to the retail jewelers, was unanimously passed, and THE CIRCULAR heartily recommended to every retail jeweler in the land. The Treasurer's report showed that the society was in a flourishing condition, and its roll of membership constantly increasing. Among many other communications, one from W. N. Boynton, President of The Guild of the United States, was read, and proved very interesting. An election of officers resulted in the choice of W. C. Somers of Springfield, President; Mr. G. Anderson, of Taylorville, Vice President; John E. Boynton, of Jerseyville, Secretary and Treasurer. On motion of O. E. Curtis the President was empowered to select delegates to attend the meeting of the U. S. Guild at Rock Island, May 11. Springfield was selected as the next place of meeting.

The Jewelers' League.

We devote this column to the interests of the League and its membership. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will be herein answered. Address *Jewelers' League, Box 4001, P. O. New York*, or the office of THE CIRCULAR.

The Executive Committee at each of its monthly sittings, have to return many applications for want of care in reading and answering the questions which are so carefully put, in the blank forms; if applicants were aware that each answer is carefully considered, both in itself and in its relation to the others, they would, perhaps, show greater precision in answering them. Another cause of postponement in the acceptance of applicants is that so many fail to specify the "full name and address of the person or persons to whom he desires * * * to have his death loss paid," (Art. I, Sec. I, By-Laws). The spirit and letter of the Constitution and By-Laws require that a beneficiary or beneficiaries should be specifically named, rather than that the benefit should be left to "my heirs," "my executors," "my estate," (or as some applicants would have it "to myself") and such has been the

constant ruling of the Committee; they require the beneficiary or beneficiaries to be named, and where more than one beneficiary is named, how each one respectively shall share, and thus save possible litigation between the League and claimants. Again, they object to making an "estate," or other equivalent term, a beneficiary because, while the efforts of the League are to benefit the family of a deceased member, or such relative or friend as he may have designated, the benefit is liable to be subverted to the creditors of a member's estate in case he dies insolvent, and thus go quite abroad of the intent of the members, and of the expectations of the deceased member's family. If members will name their beneficiaries, the League officers will see that no other person gets the benefit; the first or any other consequent disposition of intended benefit is not irrevocable; the beneficiary may be changed at any time in conformity with the wish of the member only.

The second effort of the life insurance interest to trammel the operations of societies like the Jeweler's League in New York state, by the introduction and attempted passage of a bill to virtually prohibit their existence, has ignominiously failed. The union in which the League is represented has heretofore been content to await the successive attacks and to act on the defensive, well knowing that the time would arrive when it would be politic to reverse the respective positions of the two parties in the contest. The power developed in opposition to Mr. Husted's bill was simply enormous; a vast popular protest went up to Albany in the form of formal protests with formidable arrays of signatures, and of personal letters to the members of the Legislature, and we doubt if they were ever before so well informed as to the numbers and purposes of the benevolent societies of our state, or upon any other subject upon which their constituents could so vigorously advise them. While their attention was directed to, and while they interested in the subject, Mr. Duguid, of Onondaga introduced the following bill, which promptly passed both the Assembly and the Senate.

AN ACT in relation to charitable, benevolent and beneficiary associations and societies:—

SECTION 1.—All associations and societies, whether voluntary or incorporated under the laws of this State, or of any other State or Territory of the United States, doing business in this State, which heretofore have or hereafter may issue any certificate to or have made or may make any promise or agreement with their members whereby upon the decease or sickness or other physical disability of a member, any money or other benefit, charity, relief or aid is to be paid, provided or rendered to such member or to others dependent upon him or beneficiary designated by him, provided such money, benefit, charity, relief or aid are derived from voluntary donations or solely from admission fees, dues and assessments collected or to be collected from the members, and interest and accretions thereon shall be exempt from the insurance laws of this State.

SEC. 2.—This act shall take effect immediately.

This bill in usual course went to the Governor, Alonzo B. Cornell. It has been the custom of the Governors, when disapproving of a bill, to offer to the supporter of the measure the opportunity to be heard by the Governor in its behalf, but no such courtesy was extended to Assemblyman Duguid; on the contrary, the bill and veto message were snatched up and saved from immediate action only by the prompt action of Mr. Duguid in having both the message and the bill tabled when they appeared, and they were placed in the custody of Mr. James A. Cheney, Clerk of the Assembly, and a member of the Jewelers' League. To Mr. Cheney the League is deeply indebted for the cheerfully expended labor and thoughtfulness shown in many ways during the pending of the bill at Albany.

While this column is being written, active and powerfully concerted action is being taken to show the members of the Legislature that their constituents to the number of probably 200,000 in this State, members of benefit societies, demand the passage of the bill over the Governor's veto.

At the last regular meeting of the Executive Committee, the following named candidates were admitted to membership: Joseph Abright, Auburn, Ind.; Frank L. Auchambault, Philadel.

phia, Pa.; Luther F. Arnold, New Haven, Conn.; Perkins E. Baldwin, Boston, Mass.; David H. Barnet, Newark, N. J.; Cornelius F. Bevan, Ottawa, Ohio; William F. Boogher, St. Louis, Mo.; Charles H. Brooks, Ithaca, N. Y.; Frederick W. Brooks, Ithaca, N. Y.; William O. Clark, North Attleboro, Mass.; Edward S. Deveaux, New York City; William Fuchs, Philadelphia, Pa.; Joseph Gans, Tuscaloosa, Ala.; William B. Goodall, Philadelphia, Pa.; John Hall, Baltimore, Md.; Robert U. Hendrick, St. Joseph, Mo.; Frank Herschede, Cincinnati, Ohio; John H. Hutchinson, Portsmouth, N. H.; Henry H. Jacobson, Chicago, Ill.; James F. Leighton, St. Louis, Mo.; Robert E. Macomber, Richmond, Va.; Adolph W. Magerhans, New York City; Charles I. Meigs, Branford, Conn.; Miles A. Morehouse, Johnsbury, N. Y.; Carl Petersen, Washington, D. C.; Simon Pfaelzer, Philadelphia, Penn.; Louis N. Philbin, La Fayette, Ind.; Henry W. Rupp, Phila. Pa.; George W. Scherr, Philadelphia, Pa.; Moses Schwab, Cincinnati, Ohio; Thomas W. Short, North Attleboro, Mass.; Carlton C. Sigler, Cleveland, O.; Walter H. Tarlton, New York City; Norman G. Taylor, Manchester, Vt.; Henry G. Thresher, Providence, R. I.; Alfred W. Weinberg, Chicago, Ill.; Joseph G. Willeke, Springfield, Mo.; James S. Wood, Newark, N. J.

Thirty-eight in number, making a total membership of 1,178. At that meeting 3 applications were rejected and 14 were referred for correction or laid over for consideration.

The general fund amounts to \$2,107.87, and the benefit fund \$2,238.25.

Attempted Blackmailing with Fatal Results.

ONE of the most outrageous cases of blackmailing upon a large scale was developed recently by the killing of a miscreant named Hermann Johannes Sagert, of Berlin, by Detective Campbell, of this city. Mr. Louis Strasburger, of No. 15 Maiden Lane, was the person from whom the blackmailers sought money. Mr. Strasburger is a prominent importer, a man of excellent character, and one who possesses the confidence and respect of the trade in a high degree. He lives with his wife and four children at No. 128 East Sixty-first street. One of the children is a girl of eleven years, called Rose. The family attend the Synagogue at Lexington avenue and Fifty-fifth street, and there the children go to school. Charles Adler, Mr. Strasburger's partner, lives at No. 26 West Fifty-fourth street. The two men married sisters. The threats of the blackmailers were often directed against both families, and addressed to the ladies upon whose fears they expected to work. In Mr. Strasburger's family Miss Louisa Spelten was governess.

Christmas Day a letter addressed to Mrs. Strasburger and Mrs. Adler jointly was received at Mr. Strasburger's house. It was printed by a type writer, as was also the address on the envelope; and, like all of the succeeding correspondence, was in the German language. The letter ran as follows:

You are no doubt aware that your husbands were sentenced to pay \$60,000. We now address you, my dear madams, personally, and repeat the demand, which we expect to be complied with unless you want a funeral soon in your families. If you are willing to hinder bloodshed, Mrs. Strasburger should ride on a Seventh Avenue car alone to the corner of Broadway and Barclay street. Let her have plenty of money, and between 3:30 and 4 o'clock walk from Broadway at Barclay street to West Broadway three times, carrying the envelope containing the money exposed in her hand.

EXECUTIVE COMMITTEE.

This message caused some merriment in the family, as a remarkably clumsy attempt at blackmail. When it had ceased to amuse, it was forgotten, and nothing whatever occurred to disturb the peace of the household till Sunday, March 27, fully three months later. On that day an attempt was made to kidnap Mr. Strasburger's little daughter. The child was at school in the forenoon when a little girl brought a letter, given to her by a stranger in waiting outside, to Rabbi Huebsch, who was in charge of the class. It read as follows:

March 27, 1881.

The Rev. Dr. Huebsch:

I herewith request you to let my daughter Rose go home at once, on account of the sudden sickness of one of the family.

STRASBURGER.

Other letters of a threatening character continued to be sent to the family, and Mr. Strasburger put the case into the hands of the detectives. March 29 another letter came, containing further directions as to the mode of delivering the money. Under instructions of the police, they were followed in every particular. Mrs. Strasburger, followed by officers, went over the prescribed route, carrying an envelope, and day by day traveled through the city on the errand, but in vain—nothing was heard of the blackmailers. Mrs. Strasburger was becoming greatly worried for fear that evil would really befall her family.

The climax was reached on the day when Sagert was killed. In the morning a man called at the house with a letter for Mrs. Strasburger, but she being out he departed without leaving it. Detective Campbell was then stationed in the house to watch for his return. A little later a boy came with the following note:

What does this mean? Immediately upon the receipt of this note let Miss Spelten leave the house with the envelope in her hand; walk through Sixty-first Street toward Central Park and into the Park. If she does not do this I have only to regret that I ever wrote to you. If I were in your place, I would have finally increased the sum out of my own means. Are these my thanks? If it is done as mentioned above, then Miss Spelten shall drop the envelope as soon as she hears a pistol shot, and quietly pass on without turning around. This will happen very likely on Sixty-first street.

EXECUTIVE COMMITTEE, Third ave.

The time for action apparently had come. A package was immediately made up to resemble the original envelope, and at 12:30 o'clock, a few minutes after the receipt of the letter, Miss Spelten left the house and walked leisurely toward Fifth ave. At the same moment Detective Campbell climbed over the fences in the rear of the house and made his way into Sixtieth street. At Madison ave., on the southeast corner he observed a man standing and looking at Mr. Strasburger's house; another man walked past him and signs of recognition were exchanged by the two. The second man continued on toward Fifth ave., while the man who had been standing on the corner walked over toward Sixty-first street and crossed the street. Miss Spelten was approaching at that moment, and as she reached the corner a pistol shot was fired near Fifth ave. The governess dropped the envelope and walked toward her home, as directed, without looking around. The detective at this moment was approaching with the air of a man lost in thought. The man who had come from Sixtieth street, throwing a cautious glance around, stooped down as he approached the envelope, and picked it up. As he straightened himself the officer's hand was upon his coat collar. With a violent jerk the man rose to his full height and with a curse threatened to blow the officer's brains out. He put his right hand to his hip pocket. The detective drew his revolver and cocked it. The left hand of the prisoner struck the hand that held the weapon with a sounding blow. Whether by accident or design the pistol went off. The bullet crashed through the prisoner's left eye and through his skull, killing him instantly. He fell upon the pavement dead. Papers found upon his body revealed his name to be Sagert.

Subsequently the police arrested Albet W. Vogel, as an accomplice in the blackmailing scheme, and he made a full confession of the plot. He claimed that he and Sagert alone were concerned in it, and that they desired to extort money from Mr. Strasburger solely for their own use. Vogel is believed to have been the originator of the scheme, and to have led Sagert to believe that he was acting under orders of a Nihilist society. Sagert was a young man of good family, somewhat dissipated, in consequence of which he was in very low circumstances. Vogel is still in custody, and will be prosecuted to the full extent of the law.

The indignation of the entire community was aroused by the revelation made in this attempt to rob a respected citizen by terrorizing his family. The attempt to kidnap the child—for whose concealment rooms had been engaged—was only frustrated by the shrewdness of her teacher. The repeated threats to murder Mr. Strasburger, while not intimidating him in the least, caused his family the

greatest anxiety. In the letters sent to the house, there were allusions to hand-grenades, bombs, nitro-glycerine, and other death-dealing contrivances, and fears were entertained that some terrible means might be resorted to to compel the payment of the money demanded, or, in case this was refused, to wreak vengeance on some member of the family. It was with fear and trembling that the ladies ventured into the street, or permitted their children to go out or doors. For weeks they were harrowed by this terrible dread. They had to surround themselves with detectives, and these in various disguises, accompanied the ladies about the streets, when they responded to the calls of the miscreants. Fortunately, Mr. Strasburger is not a man to be treated in such a manner, and the prompt retribution that overtook one of the villains—at the very moment of his apparent triumph—and the punishment that is sure to be meted out to his accomplice, will probably deter other scoundrels of this class from repeating such a diabolical scheme. Mr. Strasburger is to be congratulated on being effectually rid of the villains who had terrorized over his family so long.

Views of Correspondents.

This department of THE CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

To the Editor of the Jewelers' Circular:

My communication published in the March number of THE CIRCULAR, to which I appended the signature "A Traveler who Makes and sells his own Goods," received some editorial comments in an article headed "Jewelers' Profits," to which, as they seem to me manifestly unjust, I should like to reply.

These comments proceed from an entirely wrong inference, which attributes to me positions I never assumed nor had any intention of assuming. The statement that "I claim the remedy for all evils complained of, is for the jewelers to abandon their special trade as such, and set up in a business as general dealers," is evidently a misapprehension of my meaning. I did not urge jewelers to abandon their special trade, but to aid that special trade by the keeping and selling of articles which would attract to their stores and lead to a sale of their jewelry. Thus I made the dealing in general articles subservient to the special trade. So much for that point. A long argument next follows to the effect that the manufacturer of a specialty can perhaps afford to sell it for ten per cent. above the cost of manufacture, because his expenses are confined to the production of the one article he sells, asserts that I probably look at the trade through special spectacles, and assumes I have a specialty, and directs the argument towards me. This is all very good, but decidedly foreign to the subject, for if the trouble had been taken to look carefully at my signature, it would have been noticed that I used the word "goods," and not "special article," which precludes the idea of my having a specialty. It seems to me that the editor looks at the subject of controversy not through "special spectacles," but through a special microscope, which magnifies and distorts the slightest grain of difference between us. Neither do I address the manufacturers or jobbers, but the retail dealers, and arguments drawn as to the effect of my plans on the two former departments of the trade are also foreign to the subject. "To mix jewelry up promiscuously with dry goods, groceries, etc. is to rob the trade of its distinctive and characteristic features, and degrade it from its rank among the fine arts to a mere dickerer occupation." Very well, gentlemen, if you wish to run your business on sentiment, you have a perfect right to do so, but sentiment never made a business a success. Indulge in rhapsodies over the lustre of your diamonds, the quality of your pearls and the exquisite workmanship expended on your watches and your gold and silver work; chant its praises day and night; how much more profit will your books show at the end of the year? No, it is the almighty dollar for which we are obliged to labor, and we are looking at this important matter from a business, and not a sentimental standpoint.

"We protest against jewelers being placed in the category of promiscuous dealers in all sorts of things foreign to the business," con-

tinues the article. I have never so placed them, for I do not consider any article of legitimate use, foreign to a business which it serves. If in a summer watering place where lawn-tennis and archery are favorite sports, a jeweler attracts custom to his shop by having a well selected assortment of implements for these games on hand, and increases his sales of jewelry thereby, which he is certain to do, I do not then consider that these articles are foreign to his trade, but most intimately connected with it. No, gentlemen, it is as I said before, a question of dollars, not sentiment. You will all admit that dealers in other lines are cutting into your trade. Then why not follow their methods and cut into theirs? If you can aid and advance the sale of your jewelry by the selling of any article of demand, pictures, athletic implements or if it were possible the demand for it was great enough for it, even codfish, you have a perfect right to do so. As I said in my former communication, there are plenty of pushing young houses who will supply you with attractive articles at low rates; who recognize themselves the necessity of keeping for their customers full stocks, not alone of jewelry, but of other articles which will aid its sale in different localities.

A TRAVELER WHO MAKES AND SELLS HIS OWN GOODS.

PROTECTION FOR RETAIL DEALERS.

To the Editor Jewelers' Circular:

In the March number of THE CIRCULAR I noticed a communication from "A Traveler who Makes and sells his own Goods," in which he takes the stand that the several retail jewelers' associations are not likely to accomplish their objects, which he acknowledges to be good ones, because they have not taken the right course.

He says our organizations are justly attracting much attention, and though he intimates that the thing won't work, it is very evident from the tone of his letter that the thing is already working much better than he wishes it would, for it is likely he occasionally loses a sale to a regular jeweler because he is in the habit of selling to outsiders; because the "goods must be sold, and will be bought by the people who want them"—which are the dry goods, crockery, pawnbrokers' and dollar stores, in his estimation—and they get the trade away from us retailers, because they will sell at a smaller margin than we.

He don't believe we can "starve out the enemy by refusing to buy of first houses who retail or sell to irregular dealers," but I can assure the gentleman that I believe the only way we can secure our own line of goods to ourselves, is to "starve out the enemy" by refusing to deal with him. Notwithstanding large amounts of jewelry, clocks and silverware are sold by outside parties, the greatest bulk is sold by the regular trade, and if the regular trade will withhold all patronage from the "enemy," how long will it be before he is "starved out?" The associations do not claim that the manufacturers and jobbers have no right to sell to irregular dealers, but we do claim that by so doing they are working us a great injury, and we do not propose to assist at our own funeral by patronizing them, so the associations were organized the better to mutually inform each other what manufacturers and jobbers we should withhold all further patronage from, believing that if all regular dealers will refuse to patronize them, they will soon see that we are in earnest, and come to our terms, which are not unreasonable.

"Traveler" claims that we can stop this outside dealing by selling at small margins of profit; but I claim that the public cannot tell whether profits are large or small, and he is probably acquainted in towns where all the jewelers get by the ears and cut prices, but in such cases did he ever know of the sales being larger, and the jewelers to get rich? Or did it even put an end to outside dealings?

When the regular retail dealers really get waked up to their own interests and determine to remedy the evil, the only way it can be accomplished is through the associations, each member honestly pledging himself to refuse all patronage to manufacturers and jobbers who persist in dealing with outsiders. Then their trade will fall off enough to clearly demonstrate the fact that the trade is in earnest, and they will realize that if they wish to serve themselves, they must do all in their power to protect the legitimate retailers, and the only way they can do it is to refuse to allow their goods to be handled by irregular dealers. When this state of affairs is brought around, everything will be lovely and the jobber and retailer on good terms. The jobber will sell as many goods, the legitimate retailer dealer will sell more, bills can be settled at maturity, and a genuine good feeling pervade the whole trade. Hasten the day when such a state of affairs can be looked for.

Yours respectfully,

W. H. THORP, Secretary Wisconsin R. J. Ass'n.

• Unique American Gems.

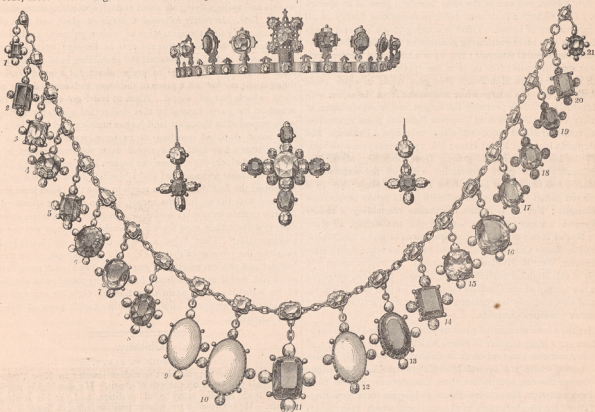
IN the April issue of THE CIRCULAR we mentioned the fact that we had been shown by Dr. A. C. Hamlin, of Bangor, Me., a unique collection of gems, purely of American origin. In the present issue we present an illustration of them together with a description of the different stones embraced in the collections. These gems were worn by Mrs. Hamlin, at the Inauguration ball, on the 4th of March last, where they attracted marked attention, and were especially admired by connoisseurs because of their remarkable beauty and lustre, and because they are of purely American production. Dr. Hamlin has been long known as an enthusiastic collector of gems, as his father was before him. Many of the gems in this collection were procured by his father, but the doctor himself has been particularly fortunate in being able to add to it a majority of the specimens. As a whole, the collection has not its equal in the country, and, of course, nowhere in the world. It in fact represents the research of sixty years in this field of exploration and collection. As to intrinsic merit and value, these American gems of all kinds compare favorably with

line of dark crimson hue, 5 k., from Maine. On the left is one of the finest of yellow beryls ever found in Massachusetts. It was discovered by the late Prof. Burbank twenty years ago. The remaining stones are white and pink tourmalines from Maine, a fine opal from Mexico and a choice blood red garnet from Arizona.

THE EAR DROPS are composed of pink tourmalines, from which are suspended clear green tourmalines set with white beryls; all from Maine and Massachusetts.

THE BROOCH is arranged in the form of a cross, in which twenty gems are set in massive gold. Among them are green, red, pink, white and blue tourmalines from Maine, white, blue, red and yellow sapphires from Montana, white, yellow and bluish beryls from Massachusetts, forming an unique collection that could not be matched with native gems.

THE NECKLACE. The necklace is formed of twenty-one links of gold, each link containing a beryl from the granite ledges of Massachusetts. From every link a pendant is suspended. Some of these pendants contain gems of great beauty, and in fact they



the best products of the old world, both as to form, color and brilliancy. While some of the specimens are to be met with frequently, others are exceedingly rare. This collection could not be duplicated for any money at present, although it is more than probable that in the future American soil will be the main dependence of the world for precious gems. While Dr. Hamlin cherishes these specimens as the apple of his eye, it is, nevertheless, a collection which should be treasured in the archives of the nation, and be properly provided for in the Smithsonian Institute at Washington. Below we give a description of the several articles comprised in the collection, as depicted on our illustrations.

THE BANDEAU OR TIARA consists of a row of white beryls set in gold, all from Maine, New Hampshire and Massachusetts. Above this row or beryls arise a number of points containing fine gems. The central point is composed of an emerald green tourmaline set with beryls, all from Maine. On the right is placed a rare tourma-

exhibit many of the finest precious stones found in the United States during the last century. The necklace is intended for the display of North American gems alone, but on the present occasion some few gems from South America were introduced to produce harmony in size and color.

No. 1 is a crimson-red tourmaline of exquisite color, unchanged by candlelight; set with opals; No. 2 is a steel gray colored tourmaline with white beryls, from Maine; No. 3 is a pink topaz, with turquoise; No. 4 is a white beryl of remarkable lustre, from Maine, set with green tourmaline; No. 5 is a beautiful crimson red tourmaline of 5 k. weight, brought by Dom Pedro from South America and given to the naturalist Hidden at the time of the Centennial. Mounted with white and perfect phenakites; No. 6 is a 9 k. emerald from Granada, set with chrysoberyls; No. 7 is a perfect sea green beryl or aqua marina from Royalston, Mass., and is one of the finest the locality has produced. Set with white sapphires from the El Dorado bar in Mon-

tana; No. 8 is a magnificent red tourmaline of 9 k. from Maine, set with turquoise from New Mexico; No. 9 is an immense turquoise of more than an inch in length, is of an exquisite light blue color and faultless. It is set with opals and diamonds. This superb gem of its species, is from the Carrillos Mountains, and inferior only to that which has been preserved for centuries in the Navaho Nation of Indians; No. 10 is the beautiful opal more than an inch in length, and named Oberon, from the "Midsummer Night's Dream." It is set with diamonds and is faultless. The lower portion of the gem exhibits arborescent forms of golden, red, blue and green hues, while above, a broad band sweeps across the stone, exhibiting gleams of red, gold and green, as the angle of the ray of light which falls upon it is changed; No. 11 is a matchless green tourmaline of 28 k. in weight, and without a flaw. Although it is of rather a dark tint by daylight, it displays by gaslight a beauty of color, rivaling the finest emerald. It was discovered in the state of Maine, and is set with four fine pearls taken from the clam shells of the brooks of Maine and the Miami valley in Ohio; No. 12 is a superb opal named Titiana, and is a match for Oberon, and one of the most beautiful gems of its species known. It is without a fault and exhibits marvelous flashes of all colors in a variety of forms. There is nothing in the mineral kingdom that can give more entrancing glimpses of fairy land than these two opals from Central America; No. 13 is a large and perfect yellow topaz set with opals; No. 14 is a fine peridot from Colorado, set with sapphires from Montana. This gem rivals in color those from Arabia; No. 15 is a large white tourmaline from Maine, set with green tourmalines. It is probably the largest and finest specimen of the variety known; No. 16 is an immense light sea green tourmaline of 20 k., found in Maine more than sixty years ago. Faultless, and set with pearls from the Maine clam; No. 17 is a rare yellowish tourmaline from Maine set with red garnets from Fitchburg, Mass.; No. 18 is a beautiful light green tourmaline with two red tourmalines from Maine, and two yellow beryls from Fitchburg, Mass.; No. 19 is a superb red garnet from Montana set with bright yellow beryls from Massachusetts; No. 20 is a fine tourmaline resembling a choice chrysoberyl of a warm green hue, set with red tourmaline, all from Maine; No. 21 is one of the two best specimens of green spodumene yet found in North Carolina, and named by J. Lawrence Smith after its discoverer, Wm. E. Hidden, the naturalist. It weighs about 2½ k. and is of the brightest emerald green, without the flaw which so impairs the beauty of the Granada emerald. The gem is of the finest water and hue, and may be regarded as settling the question whether our country possesses emeralds.

Besides the above mentioned gems at present attached to the necklace, there are a large number of others which can take the place of the South American gems when it is desired to wear only native gems. Among these are several beautiful tourmalines of various hues. One of the rare blue ioilites from Connecticut, garnets from Pike's Peak and New Mexico, amethysts and beryls from New England. There are also belonging to the necklace, which may be attached at will, some of the rarest of the gems, such as a fine blue topaz of 34 k. from Siberia, a white Siberian phenacite, a green garnet from Siberia, a yellow zircon from Ceylon, an image carved from emerald green jade from China, a fine asteriated sapphire and an exquisite moonstone, both from Ceylon; also a 14 k. blue sapphire and a 5 k. red sapphire from India; also chrysoberyls, spheens, beryls and zircons.

As a collection of native gems it is quite remarkable, and is far superior to the casket of Scottish gems set in gold, which was presented by the ladies of Edinburgh as a marriage gift to the Princess of Wales. It surpasses the famous necklace of amethyst from Kerry Head in Ireland presented to Queen Caroline, or the collier of flashing stone of iridised quartz from the Pyrenees, which was worn by the Empress Josephine and greatly admired by the dilettante of the Imperial Court.

This famous necklace was worn at the Inauguration Ball, by Mrs. Dr. Hamlin, and was universally admired,

Story of an Amateur Clock Maker

A STORY which points its own moral is being told of a well-known citizen who came limping into one of our jewelry stores the other day with a water pail in his hand containing the demoralized remains of an eight-day clock. The jeweler had the curiosity to inquire how the thing got so badly mixed, and after a little hesitation the victim told his story. "You see, last Sunday morning this confounded clock stopped, and I wound away at it for some 15 minutes, thinking it might have run down a little before the usual time; but 'twouldn't go, and during the afternoon I got to thinking it over and quietly made up my mind when wife went to church in the evening that I'd look the thing over and save paying out a dollar or two for repairs. I got so impatient to begin work that it seemed as though Sarah would never start for her prayer-meetin', but at last she did, and no sooner was she out of the house than I began operations. I got a small table, took down the clock, removed the works and then began taking out the screws that held it together. As I loosened the last one there was a sudden whizz, bur-r-r, whiz, and for an instant I saw wheels and springs flying all about and felt something sharp strike me in the face. Instantly followed a crash of glass, and then all was darkness. My first thoughts were of a nitro-glycerine explosion and that some one mistook me for the czar of Russia; next of an earthquake, and I tremblingly awaited the crumbling in of the house. At length I mustered courage to grope about for a match, and while doing it cut my foot on a piece of the lamp and crushed one of the clock wheels out of shape. When at last I got a light and looked round on the havoc caused by that dod-rotted eight-day spring, the room appeared as though a land-league meeting had been held there and some disputed question of parliamentary law had arisen to be settled after a free fight. All round were scattered pieces of that confounded clock, the oil from the broken lamp was soaking into the carpet, the table was smashed and I bleeding from the face and foot. I grabbed the first thing within reach to wipe the blood from my person, and soak the oil from the carpet, only to discover afterward in a lengthy curtain lecture on wickedness in general and mine in particular, that the article used for a handkerchief and mop was my wife's precious 'tidy.' Then I got a broom, dust-pan and water-pail and swept up the remains of that clock, and here they are. You can sort 'em out and put 'em together if you like, it 'twon't cost more than the clock did, and if ever you hear of my fooling round with the spring of an eight-day clock again on a Sunday night, or any other time, you may book me for an idiot. I'd rather tackle a can of dynamite with a hammer.

Obituary.

GEORGE W. PLATT.

George W. Platt, probably the oldest jeweler in New York City, died at his residence on the 5th of April. He was highly respected in the trade for his many good qualities, and for his sterling integrity. He occupied a prominent position, also, in financial circles, being a director in the Broadway National Bank, whose officers at his death passed resolutions expressive of their esteem for him. The deceased was born in Huntington, L. I., Aug. 2, 1798. Commenced business on his own account in 1819, as a manufacturer of shingles. Shortly after took as partner Nathaniel Potter of Long Island, which partnership proved very successful. He bought out Mr. Potter's interest, and continued on his own account until 1828 or 1829, when he took his brother Matthew (who was at that time his apprentice) into partnership, under the firm name of G. W. & W. C. Platt, and extended the business by dealing in watches and jewelry. This firm continued until 1834, when another brother, David, was admitted, and the style of the firm became Platt & Brothers. In 1842 David retired, and the remaining partners continued the business under the name of Platt & Brother until 1861, when Nathan retired—since which time George W. Platt has carried on the business in his own name. In addition to being a dealer in watches and jewelry, Mr. Platt also carried on an extensive bullion and refining business. G. W. Platt was probably the oldest jeweler at the time of his death in the city. He never failed to meet all his obligations at 100 cents on the dollar, having passed through all the panics successfully.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Eighty-third Discussion.—Communicated by the Secretary.

[Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. Write only on one side of the paper, state the points briefly, make as early as possible, as it must be received here not later than the eighth day of the month in order to be discussed and reported in the Circular for the next month.]

ABOUT NICKEL PLATING.

Secretary of Horological Club:

Please answer the following question: How to nickel-plate with electro battery, and points in regard to electro silver-plating, etc.? I have a one-gallon battery, and find it difficult to get my nickel solution to work; and I dissolved nickel salts in water, according to direction given, and find it won't work. H.

Mr. Electrode observed that Mr. H. did not give us any particulars from which we could judge what the trouble was, and of course we could not give the remedy for it. If he means that the nickel will not deposit on the articles, the fault may be that the battery is not strong enough; there may not be a good electrical connection through the circuit, but a "break" somewhere—that is, some place where the metals do not touch on account of rust, grease, or dirt between the pieces; the anodes, or plates in the bath, may be too far from the articles to be plated; the solution may not be of sufficient strength, and so on. Mr. H. does not even tell us what salts he uses for making his solutions, nor what kind of articles he wants to plate—whether of iron or of brass, German silver, etc.—or of britannia, pewter, or other articles containing zinc or lead. Each class of articles requires different treatment. Nickel plating is a more troublesome process for the beginner than silver plating. The articles must be *thoroughly cleaned*, to start on, and after polishing should be put into a boiling solution of caustic potash from five to twenty minutes, according to the metal, and the strength of the potash solution. After the cleaning, they must not be touched with the fingers, nor exposed to the air, nor even put into water, but placed in the plating bath immediately after they are cleaned. Brass articles are first dipped into a tolerably strong solution of cyanide of potassium, after cleaning. The connections being perfect, the solution right, and the battery power correct, the anodes or plates of nickel must be of *pure* nickel, of proper size, and on each side of the article, not too far from it. By carefully observing these hints, and using good judgment, Mr. H. will probably succeed, if his "directions" are reliable. He does not tell us whose process or directions he uses, but he is advised to follow none but well-tried processes, from directions given by those who are thoroughly acquainted with all the requirements of nickel plating. Probably the best thing he can do, if he does not succeed on his next trial, is to purchase Watt's Electro-Metallurgy, and follow the instructions therein given. He will also find full directions for silver plating in the same work. We cannot give him the information he wants, because he does not state what he wants to know. As to giving a full treatise on the whole art, in our Proceedings, that is of course out of the question. We can only undertake to give specific information when the questions are specific—and the more specific they are, the better.

DISSOLVING SOFT SOLDER OFF JEWELRY.—EXCELSIOR'S WORKS.

Secretary of Horological Club:

In the March number of the CIRCULAR there is an article headed "Memoranda on Soldering and Melting." I read it, and when I finished it I thought that was just what I had been wishing for, and was happy in the knowledge it contained. I resolved to make the preparation. Accordingly I bought 2 oz. of fresh sulphate of iron and 1 oz. of saltpeter. I debated whether a tin vessel would not answer, but finally decided to take an iron vessel, least it might not answer. I took a two-ounce bottle and measured 8 oz. of water into vessel and put in the powdered ingredients, and measured how high it came in the vessel; then I added 2 more ounces. Then it boiled

until it was below the 8 oz. mark. I then set it away over night. In the morning I looked for crystals, but was surprised to find only the orange-colored sediment. I thought perhaps I had not boiled it long enough, so boiled it down more, set it aside, and same result. I now want to know whether anyone else tried it. I concluded it would not do. Please let me know if I did anything wrong, or why the crystals did not form.

While reading the last number of the CIRCULAR, I was pained to learn that our "friend in time of need," "Excelsior," was not able to continue his articles. I have found them valuable above measure. Not long ago I had a job which, if I could not have seen his article, would have left me entirely at sea. Is there any book or paper containing all his writings on horology? If so, what is it and the cost?

Yours, etc.,

E. Y. D.

Mr. Rollier said he could not explain why the process had failed with Mr. D., unless he had got the wrong kind of materials. He should get what chemists call the proto-sulphate of iron, or green copperas, and the nitrate of potassa. He believed there were some who considered nitrate of soda a saltpeter, but he used nitrate of potassa. We had given the recipe in the Club proceedings a year or so ago, but he would repeat it, as follows: Proto-sulphate of iron, 2 oz.; nitrate of potassa, 1 oz.; water, 10 oz. The exact amount of water is not essential. If too much is used you will have more to boil away, that is all. By getting the proper ingredients and following directions, Mr. D. would have no trouble. Of course the vessel used for the boiling must be clean, as this is a chemical process, and nothing else must get in with the ingredients named. Dissolve 1 oz. of the crystals or sediment in 8 oz. of muriatic acid; keep this in a bottle with glass stopper. When some is wanted for use, measure out 1 fluid ounce of this solution and add to 4 oz. of boiling water, and boil the jewelry in it, and the soft solder will very soon be dissolved off.

As regards "Excelsior's" articles, there was no book or paper which contained all of them. He had written a great deal on horological subjects of all kinds, which had been published in various journals, both in this country and abroad. But all articles signed "Excelsior" could only be found in the JEWELERS' CIRCULAR—other names or initials being used in articles published in other journals. What those names or initials were, he did not know; he only stated the facts as he was informed by a gentleman who knew, and he was also informed that for a year or two past "Excelsior" had written only for the CIRCULAR. Consequently, Mr. D. could only find what he wanted by either getting the back volumes of the CIRCULAR, or "Excelsior's" book, called the "Practical Treatise on the Balance Spring," and other topics—a work which is really "valuable above measure," as our correspondent felicitously expresses it.

"WHY WATCHES DIFFER."

Owing to the interruption of our proceedings at the last meeting, the letter bearing the above caption, from "Virginius," was not discussed. Answers have been sent in, however, by readers, so that discussion will be needless. He observed that one correspondent spoke of "the construction being at variance with sound philosophical principles." If he would state what points of construction were referred to, and how he thought that sound philosophical principles would require them to be constructed, it was very likely that considerable discussion might be stirred up, as the American manufacturers claim as a particular merit of their watches that they are based on sound philosophical principles. He then read the two answers which had been sent in, as follows

Secretary of Horological Club:

I agree with your correspondent "Virginius," there is no excuse even in common watches for that lack of uniformity and reliability found in so many of them. American watches, although not so perfect as they should be, have demonstrated this. But "Virginius" should banish all idea of anything magical about watches. They are only machines, which should be constructed on sound mechanical principles, and the repairer has only to work on this basis to discover the difficulties. A frequent source of trouble in common and medium

class work is imperfect pitchings, and pinions of improper sizes. Often a fault in the escapement, pivots not free enough in the holes, or having too much shake. If "banked up" too close, some teeth may not pass freely enough, and there will be too little slide on the locking planes, or the roller pin may drag on a corner of the fork when in position to do so, and be perfectly free in other positions.

The quick-vibrating watches of which "Virginius" complains, have the same defect that some quick train foreign watches have, and the foreigners have had something more than "thirty years" experience at the business. Possibly "Virginius" may not be surprised to learn that in American factories an accomplished watchmaker is exalted (?) below every one else. Any one except a scientific horologist—lay out—the watch! A boy to do a man's work! Drifting into the business at middle age, a man never masters it. To excel, he must commence in his youth, have a talent for it, work long years—the best years of his life; study as he works, and study when not at work; in short, live with the watch.

There are few who will care to serve such an apprenticeship, and fewer still with the talent and perseverance to completely master the science as well as practice of the art; and it must be admitted that the inducements are not encouraging. G. H.

Secretary of Horological Club:

I would ask your correspondent, "Virginius," why he criticizes American watches only? Are foreign watches perfect? Some of their high-priced work has the same fault of construction that our less pretentious watches have—faults that should not exist in high or low class work, for they add to the cost of production and depreciate the value of the product; and so long as construction (engineering) is at variance with sound philosophical principles, we must not look for that uniformity of performance which "Virginius" seems to expect.

American watches, however, will lose nothing by comparison with the foreign. Where else are low-priced watches made with tempered springs, and balances that will compensate? or watches of any grade with a safety action? And, after correct construction, what else for the same expense will add so much to intrinsic value as these items? All things taken into account—the fact that scientific horologists are practically excluded from American factories—we must admit that they have done as well as might be expected. In tools, they certainly have accomplished wonders, and by fostering the trade whose business it is to build tools.

Let them give equal encouragement to capable men, whose business it is to know the watch, and their quick-vibrating work will give no more trouble, in or out the factory, than slow-vibrating.

AMERICUS.

HARDENING A BALANCE STAFF AFTER FINISHING.

Secretary of Horological Club:

Will some member of your honorable body please inform me if it is practicable to turn and finish a balance staff (sola), then temper. If so, how is the heat applied to be sure and not burn the pivots?—how cooled to not spring the staff? I notice some Swiss staffs are very hard, and to turn one it would take much time and more patience, with the best of tools. E. P.

Mr. Fugee said that the custom is to temper the staffs properly before finishing them. It might be possible, but was not practicable, to harden and temper a staff without destroying the polished surface. But it could be hardened without burning or warping by packing in a small metal tube, filled solid around the staff with iron filings and fine charcoal dust, then heat to a bright cherry red, and quench in salt water.

WHAT PARTS OF WATCHES SHOULD BE OILED.

Secretary of Horological Club:

Will you be so kind as to inform me through the CIRCULAR what parts of a watch need oiling after being cleaned, and should pivots passing through jewels be oiled?

Mr. Uhrmacher replied that all pivots and similar parts should be oiled, also the mainspring in the barrel, the ratchet wheel in its sink,

etc. There was a difference of opinion as to whether pallets should be oiled, but in most cases it was probably better to oil, taking care of course not to put on too much, so that it would run on other parts or gather dirt and cause clogging. In very fine watches, where the pallets are perfectly polished, and where the scape wheel is of gold, oil may sometimes be dispensed with, but as a rule, it is better to oil. The ruby pin and lever notch are places which should not be oiled. This is not because oil would not be beneficial there, but those parts are, or should be, so closely fitted that the least particle of dirt gathering there would be fatal to the performance of the watch, and, as the least of the two evils, the parts are run dry. Nor should any oil be put on the end of the lever fork or the roller table, for the same reasons.

HOW TO MAKE AN OIL-CUP—BOTTOM'S HAIR-SPRING GAUGE—FINISHING NICKEL MOVEMENTS.

Secretary of Horological Club:

I see "Excelsior" and others have given good directions for making oiling wires, but their endorsement of the boxwood oil-cup I don't like, simply on account of their dirty appearance. Three-fourths of the oil cups found on jewelers' benches are dirty, black, disagreeable objects—probably caused by the cup being knocked over, and the oil soaking into the wood, the wood then catching the dust and lint of the bench, soon making a black, disagreeable thing to handle, and one that cannot be entirely cleaned. I wish to tell you how I made a nice cup. Not having brass of the shape and size required for it, I took block tin and cast a circular piece about the size of a silver dollar. I then punched out the piece to a bell shape, then cast a tin rod about 1 inch diameter and 1½ inch long, and soft soldered this rod upon the upper part of the cup-shape piece. I then put it into the lathe, and turned down to the exact shape of the common boxwood oil cup, and made a top of same metal for the cup. I then took the agate out of boxwood cup and put it in a sink in top of metal cup, and then sent it to a plater and had it nickel plated. I now have a cup that oil won't soak in, and if dirt or oil gets on it, it is easily wiped off with cloth or tissue paper; besides, it does not knock over, and is a pretty ornament.

I wish to inquire as to the use, and how used, of Bottom's hair-spring gauge. Also the best way to finish concave and convex surfaces of pure nickel—that is, for ornamentation. I would like some finish similar to that put upon fine nickel ornaments.

CLYDE, JR.

Mr. Horologer replied that the gauge was used for comparing the stiffness of different springs. If a spring is too stiff for the watch, for instance, put it into the gauge, move the lever, and notice the indicated strength on the dial of the gauge. Then try other springs in the gauge, until one is found which is judged to be of proper strength. To find a spring of the same strength as the one first tried, it is of course necessary to find one which, when the lever of the gauge is moved, will indicate the same strength on the dial.

As regards the finishing of nickel surfaces, like that on watch movements, the exact method is a trade secret, but the general idea is to arrange some suitable tool or device capable of acting upon a hard surface like nickel, in a lathe, and while it is revolving bring the surface against it in a way to produce the particular effect desired. Pieces of gas retort carbon, formed in the shape of knurls adapted for the effect wanted, are preferred, as they are hard and gritty, and do not require any teeth or cutting points to be made, and can be used till they wear out of shape, and, moreover, the material is cheap. If it cannot be got directly from a gas works, any dealer in battery supplies can probably furnish it. Our correspondent can experiment with it, and if well provided with that great requisite of watch-makers, "gumption," will soon find a way to produce almost any style of ornamentation he prefers. For polished surfaces, it is necessary to put the polish on the articles before plating, as nickel is too hard to be conveniently polished—unless there is no other way to do.

Electro-Metallurgy—Silver Plating.

[Continued from page 76.]

Before proceeding to cleanse the articles, they are usually "trussed" with copper wire to avoid the necessity of handling them during the operation or afterward, until the plating is finished. A very slight contact with the hand is often sufficient to make a second cleansing necessary.

If the article to be plated presents a smooth finished or polished surface the deposit will be "bright." If, on the contrary, the surface is rough and unpolished the deposit will ordinarily have a dead lustre. If left too long in the acid dips used in cleansing, a polished surface is apt to have its finish deadened.

No interval should be allowed between the various operations of cleansing.

CLEANSING COPPER AND COPPER ALLOYS.

Potash, caustic.....	1 pound.
Water, soft.....	1 gallon.

Heat nearly to boiling in a cast iron pot provided with a cover.

Brush to remove any loosely adhering foreign matters, truss, and suspend for a time in the hot lye; usually a few minutes will suffice if the article is not heavily lacquered. If any of its parts are joined with solder it should not be allowed to remain too long immersed, as the caustic liquid attacks solders and their solution blackens copper. On removing rinse thoroughly in running water.

If the articles are much oxidized, pickle in a bath composed of—

Water.....	1 gallon,
Sulphuric acid.....	1 pint,

until the darker portion is removed. Rinse in running water and dip in the following solution:

Water, soft.....	1 gallon.
Cyanide of potassium, common.....	8 ounces.

Remove from the bath, and quickly go over every part with a brush and fine pumice stone powder moistened with the cyanide solution. Some electro-platers prefer to give the articles a preliminary "brightening dip" in nitric acid, or a mixture of nitric and sulphuric acids and salt, followed by rinsing in water; but the cyanide, aided by the mechanical action of the pumice and brush, does very well without it in most cases. After the scouring, dip the work momentarily in the cyanide solution, rinse quickly in running water, and transfer immediately to the plating bath.

Where the article is to receive a deposit of gold or silver, its surface is usually softened by slightly amalgamating it with mercury, to insure perfect adhesion of the deposited metal.

The amalgamating is performed by dipping the article, after the cyanide scouring operation, for a few seconds in a solution of—

Mercuric nitrate.....	4 ounce.
Sulphuric acid.....	1/2 "
Water.....	1 gallon.

Stir until the solution becomes clear before using. Rinse the work quickly on coming from the mercury dip, and transfer to the plating solution.

The acid, cyanide, and mercury dips may be kept in glass or stone-ware jars (avoid jars with lead glazing) provided with covers to prevent evaporation.

A "dead lustre" is imparted to articles of copper or copper alloy by dipping them for a few moments in a bath composed of

Nitric acid (36%).....	20 pounds.
Sulphuric acid (66%).....	10 "
Salt.....	1/2 pound.
Zinc sulphate.....	1/2 "

Mix the acids gradually, add the zinc sulphate, then the salt, a little at a time (out-of-doors to avoid the acid vapors), stir well together, and let it get cold before using. Rinse thoroughly and pass through the cyanide before putting in the plating bath.

CLEANSING CAST IRON.

Cast iron is freed from grease, etc., by dipping in hot alkali solution used for a similar purpose with copper, and after rinsing ther-

oughly is pickled in water containing about one per cent. of sulphuric acid for several hours; then rinsed in water and scoured with fine sharp sand or pumice and a fiber brush. It is then rinsed and returned to the acid pickle for a short time, rinsed again, and put into the plating bath directly. If more than one per cent. of acid is used in the pickle the time of immersion must be shortened, otherwise the iron will be deeply corroded, and the carbon which the metal contains, and which is not affected by the acid, will not yield without a great deal of labor to the sand and brush.

Cast iron does not gild or silver well by direct deposit. Copper or bronze deposits are better, though not perfect; but if the iron is tinned the coat is adherent and will readily receive the other metals.

CLEANSING WROUGHT IRON.

The cleansing of wrought iron, if much oxidized, is effected in the same manner as cast iron; but it will wear a stronger pickle and a longer exposure. Whittened, filed, or polished iron may be treated like steel.

CLEANSING STEEL.

Dip in the caustic lye used for copper, etc., rinse thoroughly, scour with pumice powder moistened, rinse, and pass through the following dip:

Water.....	1 gallon.
Hydrochloric acid.....	4 pounds.

Rinse quickly (but thoroughly) and plunge in the bath.

Clean wrought iron and steel gild well without an intermediary coating in hot electro-gilding baths. It is difficult to obtain an adherent coating of silver on these metals without interposing an intermediate coating of copper or brass, which renders the further operation of silver plating easy.

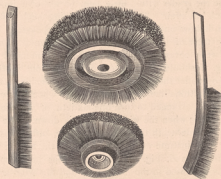
CLEANSING ZINC, TIN, AND LEAD.

Zinc is cleansed by dipping for a few moments only (as the alkali quickly attacks the metal) in the hot potash lye, rinsing, and dipping into water containing about ten per cent. of sulphuric acid for a few minutes. Rinse in plenty of hot water, and, if necessary, scour with pumice stone powder and a stiff brush. This last operation is especially useful when parts have been united with tin solder.

Tin, lead, and the alloys of these metals are more difficult to cleanse perfectly than zinc or iron. Scour rapidly with the hot potash and brush, rinse quickly and brush, or dress with a piece of soft clean wood. It is very difficult to obtain a satisfactory deposit of gold or silver directly upon these metals or their alloys. The results are much better if a coating of pure copper is interposed.

SCRATCH BRUSAING.

The scratch brush is often resorted to to remove the dead lustre on or to impart a smooth surface to an object. They are usually made of brass or steel wire, and of a variety of shapes to suit the object. Some of the forms are shown in the figure.



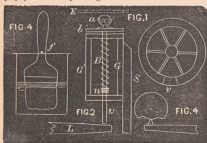
The wheel brushes are used on the lathe, the objects being manipulated in contact with the rapidly revolving brush. The brush is usually kept moistened by a small stream of water while in use.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

[Continued from Page 29.]

THE piece of thin wood mentioned in my last for a pair of bar compasses is used in this way; a bradawl is put in one of the holes mentioned, and a long slim pencil point is pushed through the other, until enough pencil point protrudes to mark on your thin wood. Cut out a small portion of your thin board, say one inch in diameter, to use as a washer to go between your bar compasses and your work-bench. Of course the reader will understand that the work is to be done in his back shop, where a bradawl hole or two in the work bench will be of no consequence. The thin slip is fastened to the bench by first thrusting the bradawl through it and then through the little washer, and the awl firmly inserted into the bench. Now the thin slip is free to turn on the awl center, and by means of the pencil point you can sweep a circle twenty inches in diameter. Next make another pencil hole one and one-half inches from the first; the pencil point when inserted in this will sweep a line parallel to the first. This simple tool will mark out the segments for a wheel twenty inches in diameter. The segments should be exactly ten inches long and one and one-half inches wide. Make a small wooden hub two inches long and one and one-half inches in diameter, and insert a wire spindle for pivots—an old Yankee clock arbor will do. Bore six holes into this hub and insert six spokes. These spokes are to glue the segments fast to so as to make a tolerable true light wheel. In such light work a little experience with glue will do wonders; loose, bad joints can be made strong and firm. Get a carpenter or cabinet maker to give you a few hints on gluing; it will pay you in repairing Yankee clock cases if in no other way. You



will need twelve segments; the first six go on as shown in Fig. 1. The spokes are to be attached to the middle of each segment and the ends of the segments to be secured by an extra piece extending and lapping across the joint, as shown at *v*, Fig. 1. Pieces are glued on the segments parallel to the axis of the hub as shown at *p p*, Fig. 2. These pieces should be one inch long, and half an inch wide, and hold another set of segments, as shown at *G*, Fig. 2. The last mentioned segments will not need any spokes or other support other than the pieces *P P*. The reader will understand that I cannot describe all the details of such a piece of mechanism, as it was only mentioned as a sample of window attraction; but I think I will be justifiable in giving such hints as will enable the reader with a little help of his own ingenuity to construct such an affair. The idea in making such a wheel is to make the rim hollow and projecting from the spokes, as shown in Fig. 2. The table of the magician, which is shown at *E*, should be of very thin wood covered with cloth, and it is intended that the button *v*, Fig. 1, should stop exactly under a hole in the table, said hole being under the magician's cup. Now the idea is that there are to be sixty buttons like *v* in the rim of the wheel, shown in Fig. 2. This wheel is arranged to turn one-sixtieth of a revolution at a time, and do this when the wizard's cup is down. The wheel is supposed to be underneath the magician's table, and as close to it as convenient. To illustrate we will suppose that the hole in the table is at the dotted lines *E*, Fig. 2. The wheel has just stopped; the shirt stud *a* is cemented to the button *v*, and the wire *w* extends through the rim of the wheel as shown; around the wire *w* is a spiral spring, *B*, of very fine spring brass wire; this spring should only be stiff enough to hold wire *w* and button *v* drawn in; as soon as the wheel stops the lever, *L*, (which is only part shown in Fig. 2, but the

action is further seen in Fig. 3), attacks the wire *w* and the button *v*, (which should be covered with the same cloth as the magician's table), rises to the height of the table and the magician's cup is raised and the stud *a* is seen. The piece *n*, Fig. 2, can be made of three turns of say No. 20 brass wire wound round a smaller wire than *w*, so as to move a little hard on *w*; a little shellac varnish applied to *n* will set it firmly in position. All the motions of both the figure (magician) and the wheel, Fig. 1, should come from cams on one arbor, and this arbor should make a revolution in about half a minute; and it is essential that all the motions should be timed so one will not interfere with another. The old clock movement I mentioned which could be used to produce the motions, can be either a time or striking side. If the striking side is used the wind or fan wheel can be retained to equalize the motion; but it will need winding too often; consequently the time side with an extra wheel and endless screw like a music box should be added. A weight is a better motive power than a spring.

In regard to the figure of the magician: It is no very difficult job to make a tolerable shaped face and head out of plaster paris and glue, or whitening and glue, and painting it; but in the colors be pretty high, that is bright, and if you can manage movable eyes, all the better. Six or eight cams on the one shaft or arbor will produce all the motions you need. Some of your lady friends will soon *doll baby* a quaint sort of a dress. The frame of the figure is best made of wire, the arms especially. The study of such automatic machinery is no bad practice, and what is better some such achievement will make a young man a great deal of reputation. I made mention some little way back about taking gluing lessons, and here let me recommend you to also take some varnishing lessons; it is by no means time lost. If a customer brings you an old Yankee clock the case of which is smoked and without glass, you can soon restore it. First wash it with soap and water, then clear water; dry with an old chamamois; buy a quart of carriage painters' rubbing varnish and keep it in a well-corked bottle—the very best is worth about one dollar per quart. When you desire to use some pour out about what you will need in a teacup; procure a flat bristle brush, one and one-half inches wide, with a tin band, and knock and shake out all the loose bristles you can; a new brush will shed bristles and if they stick in the varnish on your work pick them off with a piece of sharp peg wood. A very little practice will get you so you can do a very good job; you will have trouble with your varnish brush drying up; to remedy this take an old fruit can—a two-pound can—and melt off the top; next take a piece of sheet tin or zinc, a little larger than the top of your can, and cut a hole in it (the cover) to fit something near the brush handle; make a small hole through the handle, as shown at *f*, in Fig. 4, and put a six-penny nail through this hole and let the brush hang in spirits of turpentine in the can; fill the can about as full as shown. The turpentine will not evaporate as fast as one would suppose, and it is comparatively cheap; fill up as it evaporates—once in a week or two. Before putting the brush into the varnish, wipe out the turpentine by brushing the side of an old newspaper, and let no dust be on the paper.

(To be continued.)

AS a sign of returning business prosperity in Switzerland may be noted the fact that the watch trade has lately become so active that manufacturers are raising their prices for unfinished watch movements by eighty per cent. and for finished watches thirty per cent. This has probably been brought about by the burning down at Beaucourt, in the French Jura, of one of the largest watch movement factories in Europe, whereby Swiss manufacturers have greatly benefited. The Geneva gold chain trade is also very active, and as the demand comes principally from Italy, it may be taken for granted that the condition of that country is equally improving, for people do not buy watches and gold chain unless they have money to spare.—*British Horological Journal*.

To Regulate a Watch for Common Use.

BY MORITZ GROSSMANN,

*Watch Manufacturer, Member of the British Horological Institution of London.
Honorary Member of the Upper Italian Horological Union Galiati.*

INTRODUCTORY.

THE art of the measurement of time, old as it is, has made its greatest advances within the course of the last century, because during this period the old verge was supplanted by the free and re-escape escapements. While the former, with its great dependence upon its defective motive power, only permitted to count the elapsing time by minutes, the seconds hand is at present considered an indispensable adjunct to the modern watch. Public clocks also have in their rate attained a high degree of excellence, and the lightning-like intercourse of our daily life require an exact account of even the smallest fraction of elapsing time as an absolute necessity. "Time is money," says one of our expressive adages; it is our most precious possession, and should, like everything else costly, be measured and expended with minute care and exactness.

Increased obligations have arisen to the horologist from these altered circumstances; he should possess abilities commensurate with the modern demands, and should especially be able to regulate watches, without much loss of time or trouble, and make their rate correspond as nearly as possible to that of a recognized standard timepiece. The owner of a watch naturally estimates its value in accordance with the time keeping qualities, and many a watch is underrated, because the repairing watchmaker did not bestow sufficient care on its adjustments.

Since a watch, after repairs of any importance, has to be re-regulated, this become the daily task of the repairer, who is supposed to be thoroughly conversant with its intricacies. Experience, however, shows the reverse, and as professional publications impart little instructions upon the subject, I have deemed it necessary to attempt an elucidation.

I commence the task by placing the practical manipulation to be pursued foremost, leaving out of the question the construction of a watch best suited to give satisfactory results viz., good and regular rate. The repairer has to take the watches as they are and improve them to the best of his ability, and obtain what from their nature and construction is attainable. It also appeared to me out of place in these remarks to compare the different escapements and their capacities; the repairer will find mentioned only those points which may guide and facilitate his endeavors. I have deemed it of sufficient importance to say a few words upon the choice of a suitable balance spring and its mounting, as this task is within the repairer's province.

CHAPTER I.

THE CONDITIONS FROM WHICH DEPENDS A GOOD RATE.

Before attempting to regulate a watch, it is of the greatest importance to examine by a careful inspection of the entire movement, that all parts are in good order. The mainspring must develop itself freely within its barrel, all running parts must move without undue shake; no impingements or frictions must occur anywhere between them, and, finally, the depths and escapement be in best order. An equable transmission of power to the balance can only take place under these circumstances. Any one of the enumerated errors produces not alone an unnecessary expenditure of motive power, which the regulator is bound to husband with all care, but the power thus transmitted becomes irregular and unequal, and is productive of differences in extent of the balance vibrations, from which, again, depends the equality of time of these vibrations. Finally, a co-operation of several of these errors, each one insignificant in itself though it be, may produce the watch to stand still.

Second only in importance to the perfectly uninterrupted transmission of motive power by the wheelwork to the escapement and balance must be placed the manner in which this transmitted power is expended with the least possible loss of power by friction. A

majority of the watches at present constructed are fitted with jewel holes for the pivots of the different parts of the escapement, and, besides, have cap jewels for those parts most exposed to friction. If these jewelings are well set, friction is materially lessened, but jewel holes may be seen in common watches, which by their careless and unskillful execution, produce more friction and wear than a good metal hole. Wherefore carefully examine the balance holes, if they are well rounded and polished; also its cap jewels, see if they are loose, if they have well polished surfaces, and are well placed over the jewel holes, without at the same time causing pressure. No less attention must be paid to the inspection of the settings of both holes and caps; they must be straight, because a sloping position is productive of increased and irregular friction.

CHAPTER II.

THE CHOICE AND FASTENING OF THE SPRING.

Due regard must be had in the choice of a balance spring, both as to its quality and capacity to compel the balance to perform a vibration within a given length of time.

The quality of the spring will of course be proportionate to that of the watch. Best results are commonly obtained in watches of long vibrations, consequently, pertaining to the free escapements, with well hardened springs, while verge and cylinder movements go very well with a soft one. Distinguishing marks of a good one are:—1. Perfectly even coiling, that is, equal distance from one blade to the other. 2. Greatest possible elasticity. This quality is easily recognized by seizing the inner end of the spring and drawing it up, while retaining the lower end on the table. A good spring should permit itself to be drawn up twice its diameter and resume its former position, without malformation. 3. Perfect equality in thickness throughout its length; a spring, being faulty in this particular, moves irregularly because the weaker coils move more than the stronger. To judge a spring with regard to the duration of time in which it impels the balance and causes the several different vibrations, it is necessary to take into consideration other not easily enumerated conditions. The balance is controlled as well by the vibrating power as by the diameter of the spring, also by its own weight; again, by the disposal of the different proportions. Regulating would become a very simple task, if the weight or magnitude of a balance were its sole controlling power; it only would be necessary to measure or weigh the balance to obtain the right proportion of the spring requisite. But no such landmark can be established; it is well known that a balance may be constructed making an even number of vibrations with the same spring that another one does with a diameter twice as large, provided, the former is very heavy, the latter very light. Even if it were practical to ascertain the size and weight of a balance, and from these factors establish a formula for the vibration number, it would nevertheless be useless—if the disposition of the different proportions be not at the same time uniform. For example, a balance with light shanks and weighty rim would accomplish its vibrations in a time different to that of one of equal size but in an inverse ratio, although the same spring could satisfactorily be used for both. It will be seen from the preceding that no proportionate formula can be established from size and weight of the balance, to be used as a guide in the choice of power for the impelling spring; on the other hand, little advantage would be gained by such a deduction, as long as their manufacturers follow the present irrational manner. If, for example, they were to adopt fixed rules to observe an undeviating proportion between breadth and strength, more dependence could be placed in the numbers with which the springs are marked to indicate their supposed strength, provided, however, that their elasticity also were uniform.

The reader will conclude from these remarks that measurement and calculation leave us in the lurch for once, and so they do, or at most barely offer us a point for fulcrum, and only then under certain conditions and suppositions. The repairer whose task is ever varied and manifold, is compelled to seek auxiliaries other than those established by practice.

If a spring is to be chosen to a given balance, begin first to count

the wheels and pinions, commencing with the center wheel, or, by watches with seconds hands, by counting the teeth from fourth and escape wheel forward, (the escape wheel seldom varies from 15 teeth), if the balance makes the usual number of 18,000 vibrations per hour. This is the case by an escape wheel of 15 teeth, and when the number of fourth wheel teeth is proportioned to the escape leaves as 10 : 1 : when, consequently by a 6-leaf pinion the wheel has 60, by a 7-leaf pinion, it has 70 teeth.

Hereupon base a preliminary choice from the assortment of springs at your command; seize one by the outer coil, suspend the balance from the inner one, and notice how much this weight draws the inner coil from its flat form. An approximate judgment can only be formed by due experience. Moreover, this method of testing a spring is by no means reliable to judge of its power, because it stands to reason that the power of a spring is proportionate to the sum of its section, that is, the product of its breadth and thickness. One very broad and thin may have the same product with one narrow and thick; it will be found, however, on testing both in the above manner, that the results will be quite different. The broad but thin one will resist the suspended weight more than the narrow one, but will, when practically used to propel the balance, be found the weaker of the two. The repairer is compelled to experience this daily, especially with the lower sorts, that the Swiss springs often possess in stronger sizes a narrower face than weaker ones; and it stands to reason that the spring of rights should be tested in the same position it occupies in a watch, and not in one rectangular to it, as is the general custom. A special contrivance is necessary to do this, however. A satisfactory approximate examination, when conducted with due circumspection may be made in the following manner.

Having tested the spring preliminarily to ascertain its qualities, satisfy yourself by a close examination, before expending pain and labor upon it, if the one chosen will cause the balance to make the necessary number of vibrations without having to materially alter it either way. It should be mentioned in this connection that a spring ought not to exceed two-thirds of the balance diameter. The distance is already indicated by the curve pins in movements with flat springs; those working with the Breguet spring, with outer coil curved upward, have no such arrangement, it is recommended not to exceed the above specified limits.

The number of coils requisite for a good proportion in size cannot be fixed very easily since those in market are very different in the width of their coilings from one blade to the other, and do not even possess a trace of uniformity of system. It may be remarked however, in a general way, that the better qualities of Swiss springs are wound somewhat closer than is desirable, and it is necessary to give them, if the regulator do not choose to have an extra small diameter, from 13 to 15 acting coils. A spring with a larger number of closely woven coils begins to assume the character of a body with a noticeable ponderance, and this is introduced a new source of irregularities into the rate of the watch, in the different positions; it becomes a self-acting body, liable to be influenced by extraneous shocks when worn.

Take the spring which upon a cursory investigation was found suitable, having a somewhat greater diameter than it is ultimately destined to have, place the collet upon the balance, and locate its inner incurved end into the collet hole. The inner coil is generally close enough to be forced upon the collet, thus being retained both by the end inserted within, and by the clinging of the inner coil upon its circumference. This fastening is sufficient for purposes of closer investigation and reduction of the spring to its final dimensions. Next place the lower balance pivot upon a smooth surface, say a piece of glass, and draw it upward, catching hold at the outer end of the spring, in such a manner that the balance cannot fall sideways. Then cause it to vibrate and compare its motions with those of a clock of like calculation. It is preferable to place a going movement of the same number of vibrations into a small box with glass cover, set the balance with the trial spring going vertical to that of the known movement; little experience is necessary to detect the smallest

deviation in the rates under comparison. Should the balance with the trial spring vibrate too quickly, take a weaker one; on the other hand, catch the spring a little farther from the outer end, and compare anew; continue your experiments in this manner, until a perfect uniformity of rate has been established. Should the active length of spring become out of all proportions, take a stronger one.

This method of testing cursorily a spring is very simple, and with a little experience very reliable; the spring chosen and found suitable may be fastened and placed in order, without entertaining any doubts that the labor might have been expended in vain.

(To be continued.)

Solders and Alloys.

IN order to connect two pieces of metal, to have the appearance as if one piece, they are soldered together. They may be united by a solder of their own kind of metal, as well as with some other. The melting point of all solders is generally below that of the metals which they are intended to unite. If a piece of metal requires to be soldered several times, the melting point of the different solders must decrease gradually.

The following recipes are obtained from different authors and practical men, and may be relied on.

GOLD SOLDERS.

Soft: 60 parts 18 karat gold, 20 coin silver, 10 copper, 10 zinc; *middle:* 68 parts 18 karat gold, 24 coin silver, 12 copper; *hard:* 85 parts 18 karat gold, 10 coin silver, 5 copper.

ANOTHER AUTHORITY.—Soft, for articles above 14 karat: 10 parts 14 karat gold, 5 coin silver, 1 zinc, to be used for jewelry not to be colored, as it turns black in the process, only for yellow gold; *hard:* 16 parts pure gold, 9 coin silver, 8 copper; *enamel solder,* for articles to be enamelled: 37 parts pure gold, 9 coin silver; or, 16 parts 18 karat gold, 3 coin silver, 1 copper.

ANOTHER AUTHORITY.—6 karat solder: 6 parts pure gold, 12 coin silver, 6 copper.

ANOTHER AUTHORITY.—For 18 karat, to be colored: 1 part pure gold, $\frac{1}{2}$ coin silver, $\frac{1}{4}$ copper; *soft, for 18 karat:* 1 part pure gold, $\frac{3}{8}$ coin silver, $\frac{1}{4}$ copper; for 14 karat, to be colored: 1 part 14 karat gold, $\frac{1}{4}$ coin silver; *soft, for 14 karat yellow:* 1 part yellow gold, $\frac{1}{4}$ coin silver, 1-9 brass; for 12 karat, to be colored: $\frac{1}{2}$ part pure gold, $\frac{3}{8}$ coin silver, $\frac{3}{8}$ copper; *soft, for 12 karat:* $\frac{1}{2}$ parts 12 karat gold, $\frac{1}{8}$ coin silver, 1-16 soft silver solder; for 8 karat yellow: 1 part 8 karat yellow gold, 2 12-parts sterling silver, $\frac{1}{4}$ brass, $\frac{1}{4}$ zinc.

SILVER SOLDERS.

Hard: 1 part coin silver, $\frac{1}{2}$ copper, $\frac{1}{4}$ brass, 1-16 zinc; *middle:* 1 part coin silver, $\frac{3}{8}$ copper, $\frac{1}{2}$ zinc; *soft:* 1 part 12-parts sterling silver, $\frac{1}{8}$ brass, 3-18 zinc.

ANOTHER AUTHORITY.—Soft: 39 parts 14 parts sterling silver, 46 brass, 15 zinc; *middle:* 66 parts 14-parts sterling silver, 34 brass; or, 70 silver, 30 zinc; *hard:* 80 parts silver, 20 brass; *very hard:* 84 parts silver, 16 copper.

Platinum can be soldered with 18 karat gold. *Aluminum* with 70 parts zinc, 15 copper, 15 aluminum. These proportions may vary from 50 to 90 parts zinc, 4 to 30 aluminum, and 20 to 40 copper.

ANOTHER AUTHORITY.—Hard: 4 parts coin silver, 3 brass; or, 2 parts coin silver, 1 brass; or, $\frac{1}{2}$ coin silver, $\frac{1}{4}$ copper, 1 brass; or, 2 parts coin silver, $\frac{1}{2}$ brass; or, 19 parts coin silver, 10 brass, 1 copper; *soft:* 7 parts 12-parts sterling silver, 1 zinc; or, 16 parts 12 parts sterling silver, 3 zinc; *middle:* 11 parts coin silver, 4 brass, 1 zinc; or, 16 parts coin silver, 5 brass, 1 zinc.

A solder of silver-like appearance: 70 parts brass, 18 zinc, 6 coin silver.

SOLDER FOR STEEL, BRASS, &c.

Hard: 88 parts brass, 12 zinc; *middle:* 80 parts brass, 20 zinc; *soft:* 60 parts brass, 40 zinc; *half-white:* 65 parts brass, 30 zinc, 5

tin; *white*: 50 parts brass, 4 zinc, 16 tin; *German silver*: 56 German silver, 44 zinc.

Fine articles of steel and iron can be soldered with gold, silver, or German silver solder; larger pieces of iron are soldered with copper or brass.

When preparing any of the solders or the following alloys, melt first the metals difficult of fusion, and add the zinc when they are melted, and only at the latest possible moment, as it is given to volatilize. Cast in bars and pass through rollers.

GOLD ALLOYS.

Green: 2 to 3 parts pure gold, 1 coin silver; *pale yellow*: 1 part gold, 2 silver; *high yellow*: 4 gold, 3 silver, 1 copper; *pale red*: 3 gold, 1 silver, 1 copper; *high red*: 1 gold, 1 copper; or, 1 gold, 2 copper; *grey*: 30 gold, 3 silver, 2 steel filings; *blue*: 4 gold, 1 steel; or, 3 gold, 1 steel; *white*: fine silver and platinum.

ANOTHER AUTHORITY.—18 *karat red*: 6 parts pure gold, $\frac{1}{2}$ silver, $\frac{1}{2}$ pure copper; 18 *karat yellow*: 6 parts pure gold, $\frac{1}{4}$ coin silver, $\frac{3}{4}$ pure copper; 18 *karat green*, for settings: 3 parts pure gold, $\frac{3}{4}$ coin silver, $\frac{1}{2}$ pure copper; 16 *karat green*, for settings: 1 part pure gold, $\frac{1}{2}$ coin silver, 1-16 copper; 14 *karat red*, for coloring: 7 parts pure gold, $\frac{1}{4}$ coin silver, $\frac{3}{4}$ pure copper; 14 *karat pale*: $\frac{3}{4}$ parts pure gold, $\frac{1}{4}$ coin silver, $\frac{1}{4}$ pure copper; 14 *karat, still paler*: $\frac{3}{4}$ parts pure gold, $\frac{1}{4}$ coin silver, $\frac{1}{4}$ pure copper; 8 *karat red*: 1 part pure gold, $\frac{1}{2}$ coin silver, $\frac{1}{2}$ pure copper; 8 *karat pale*: 1 part pure gold, $\frac{1}{4}$ coin silver, $\frac{1}{4}$ pure copper; 8 *karat yellow*: 3 parts pure gold, $\frac{1}{2}$ coin silver, $\frac{1}{2}$ pure copper, $\frac{1}{4}$ zinc; 8 *karat yellow*: 3 parts pure gold, $\frac{1}{4}$ coin silver, $\frac{1}{2}$ pure copper, 2 brass.

ANOTHER AUTHORITY.—*Yellow*: 2 parts pure gold, $\frac{1}{4}$ coin silver, $\frac{1}{4}$ copper; *green*: 1 part pure gold, 3-16 coin silver, 1-16 copper; *rose-colored*: 1 part pure gold, $\frac{1}{2}$ coin silver, $\frac{3}{8}$ pure copper; *grey*: 1 part pure gold, 5-16 coin silver, 1-16 copper, 1-16 cast iron filings; *blue*: 1 part pure gold, 5-16 coin silver, 1-16 fine steel filings; *black*: a black is produced by wetting 6 karat gold with nitric acid.

An alloy for bushing pivot holes which, it is said, causes less friction than jewels, is composed of 75 gold, 44 silver, 92 copper, 24 palladium. It is of a brownish red color, with a grain as fine as steel, nearly as hard as wrought iron, and susceptible of a high polish.

Pale brass colored: 2 parts silver, 1 gold; or, 4 parts gold, 3 silver, 1 copper; *pale red*: 1 part gold, 1 copper; or, if the article manufactured is not desired to be colored, and the ornamentation should be of a redder color than the body, 1 parts copper, 1 gold.

A Japanese alloy, of very high appearance, was analyzed by S. Kalisher, of Berlin, and consisted of 4.16 per cent. gold, 0.08 silver, and 95.76 copper. The article is of a pale or light red color, with a bluish black glittering patina on its surface, which R. Pumphly ascribes to the following process: The manufactured article is boiled in a solution of sulphate of copper (blue vitriol), alum, and verdigris, which removes the part of the copper coating from the surface, and a stratum of gold is laid bare. The bluish black sheen is simply due to an effect of the light, and its intensity is said to increase with the percentage of gold.

Dentists' gold: 8 parts gold, 3 platinum, 1 silver.

ALLOYS OF GOLD AND CADMIUM.

These alloys are important to the jeweler. They are very malleable, and may be drawn into wire. *Green*: gold, 750 parts, silver, 166, cadmium, 84; *yellow-green*: gold, 750, silver, 125, cadmium, 125; *green*: gold, 747, silver, 114, copper, 97, cadmium, 43, which gives a very malleable and ductile alloy, of a singular green color. These several alloys may be used for plating.

To produce these, and the following cadmium-silver alloys, it is necessary to melt each of its ingredients first in crucibles well lined with charcoal dust; they are then melted together in a common crucible (a graphite is better) with charcoal or powdered resin and borax. If, in spite of all care, the result shows that a part of the cadmium has become volatilized, it must be remelted with a surplus

of the latter, in order to establish the due per cent. (These alloys were patented by C. C. Abel, of London).

CADMIUM-SILVER ALLOYS.

The same gentleman also patented the following silver alloys: silver, 980, copper, 15, cadmium, 5; silver, 950, copper, 15, cadmium, 35; silver, 900, copper, 18, cadmium, 82; silver, 800, copper, 20, cadmium, 180; silver, 666, cadmium, 334; silver, 666, copper, 25, cadmium, 309; silver, 666, copper, 50, cadmium, 284; silver, 500, copper, 30, cadmium, 470. These several alloys are remarkable for their great ductility, and preferable to the jeweler.

ARTIFICIAL GOLD.

An alloy has lately appeared in England which is attracting universal attention. The recipe was a secret, but, upon an analysis made by an expert, caused the inventors to publish it, as follows: 100 parts pure copper, 17 pure tin, 6 magnesia, 9 cream tartar of commerce, 3.6 salts of ammonia, and 1.6 unslaked lime. The copper is melted first, the lime, magnesia, and salts of ammonia, and cream tartar are added, in minute quantities, however, and the whole mass is stirred for half an hour, to procure a thorough mixing; the tin now is thrown in small grains on the surface, and stirred until melted. The crucible is covered and the fusion kept up for about 25 minutes, skimmed, and the alloy is ready for use. It is very malleable, ductile, can be drawn, stamped, chased, beaten into powder or foil, with a facility equal to gold. It demands a thorough expert to distinguish it from gold, by means other than its lesser specific weight. It is already much in use in the United States.

SILVER ALLOYS.

Silver unites with most metals, only a few of these alloys, however, have, up to the present, been of any practical benefit to the metal worker. It forms several preferable alloys with aluminum, notable for their beautiful white color, but since the price of this metal is nearly that of the former, and as these alloys possess no sufficiently important virtues, they are little used. Silver combines with gold in all proportions, and several of these alloys are in use to give gold a lighter color. (See GOLD ALLOYS).

In its pure state silver is too soft and little susceptible of polish, wherefore it is commonly alloyed with copper in the manufacture of domestic utensils, coins, &c.; 9 parts of silver and 1 of copper form an alloy as white as pure silver, possessing both great hardness and resistance to daily wear, beside taking a fine polish.

One pound of silver is at present divided into 500 grams in the German States, Austria and France, and their money coined to 900, that is, it contains 900 parts of pure silver in 1,000. English coin (standard silver) contains 925 parts. Germany has no law fixing a silver standard. Sweden demands 828, France 9,125, and exercises a strict surveillance for a close adherence to this standard, under heavy mulct for violation.

M. Pelligot, director of the assay laboratory at Paris, proposed, a few years ago, to replace the present alloy of copper in silver by zinc, both for jewelry and coin; alloys produced by him contain 800, 900 and 950 parts in 1,000, the alloy being either zinc alone, or one-half zinc, one-half copper. The new alloys are said to possess the following advantages: Production without difficulty; a color fully as white as silver-copper alloy of same grade; finer ring and greater elasticity; should the metal become vitreous from long continued passing through rollers, stamps, &c., a simple glow heat will restore its elasticity; finally, they possess the advantage of not being to such a degree affected by sulphurous exhalations and gases contained in the air, as are those with copper, and, when touched with acid, they generate no verdigris.

To impart the fine white lustre to the silver-copper as well as to the silver-zinc alloys, they are dipped—that is, they are first heated to produce an oxide of the baser metal contained in the article upon its surface; this is removed by boiling in diluted sulphuric acid, to which a little cream tartar is generally added. The highest polish may be imparted to a surface thus treated.

Silver and nickel form an excellent alloy, and one which, with as

low as 12½ per cent. silver, both in color and susceptibility of polish, can barely be distinguished from pure silver; an alloy of this nature is at present much in use under the name of China Silver, for domestic utensils, plates, candlesticks, spoons, &c., and the articles manufactured therefrom deserve far greater notice than they have received until now.

A so-called One-third Silver Alloy (*alliage tiers-argent*) is not composed, in spite of several publications affirming, of ⅓ silver and ⅔ nickel, but, according to the German authority, Dr. Cl. Winkler, consists of 59.66 parts copper, 27.56 silver, 9.57 zinc, 3.42 nickel. The outer color and appearance of this manufactured alloy (of Mousset, 116 Rue de Tivoli, Paris), is in all respects that of silver, fracture very fine and close grain, color pale yellow, with a sheen into red.

Mr. Alex. Parker, Birmingham, has produced a desirable nickel-silver alloy, composed of 60 parts copper, 10 nickel, 20 silver; another one of 60 parts copper, 10 nickel, 10 silver, 20 zinc. He first melts the copper and nickel, using a flux, then adds the other metals, either singly or together.

An alloy prepared by de Ruolz and de Fontenay, is composed of ⅓ silver, 25 to 30 per cent. nickel, 37 to 42 per cent. copper. These ingredients, when melted together, form a disproportioned alloy, and phosphorus and several fluxes are added, which, however, are kept secret. The alloy is very vitreous while containing the phosphorus, but when this is driven off it appears to entirely lose the character of a conglomerate, and partakes of features only possessed by the noble metals. It has the color of platinum, is devoid of odor, specific weight immediately below that of silver, firm, elastic, may be hammered, drawn, stamped, melts easily, and takes a high polish, has a fine ring, is not in any degree affected by oxygen, and only slightly attacked by reagents. Exceeding silver in hardness, it only costs 60 per cent. as much. The author deems it of great interest to the jeweler and bijouterier for articles to be plated. It offers peculiar advantages for coinage, the difficulty attending its production would render it proof against counterfeiting.

Mr. C. D. Abel, London, has patented several alloys in England. They may be divided into two classes: one consists of alloys of silver, copper and nickel, with or without an addition of manganese. The alloys of this class may be composed in the following proportions:

A.—Silver, 33 per cent., nickel, 25 to 30 per cent., copper, 37 to 42 per cent.

B.—Silver, 40 per cent., nickel, 20 to 30 per cent., copper, 30 to 40 per cent.

C.—Silver, 20 per cent., nickel, 25 to 35 per cent., copper, 45 to 55 per cent.

The next class consists of silver, copper, nickel and zinc, with or without manganese, as follows:

D.—Silver, 333 parts, copper, 418, zinc, 163, nickel 86.

E.—Silver, 340 parts, copper, 420, zinc, 160, nickel, 80.

F.—Silver, 400 parts, copper, 446, zinc, 108, nickel, 46.

Alloys A, D and E are peculiarly adapted for articles to be rolled, pressed, stamped or drawn; C for casting; B and F for jewelry work. The percentage of silver varies in accordance with the purposes for which it is intended, from 20 to 40 per cent., and the proportion of nickel decreases in ratio with increase of silver. The purest copper is used for the first class, also pure nickel, refined best as follows:

The common impure commercial nickel is dissolved in nitric or diluted sulphuric acid, in the latter case effected by the assistance of the galvanic battery, exposing the nickel to the action of the positive pole, or by preparing the solution in a platinum vessel. It is then treated with chlorine, and the oxide of iron precipitated by boiling with carbonate of lime. The nickel is afterward deposited by soda, again dissolved in muriatic acid, diluted with quantities of water, saturated with chloric gas, then treated with carbonate of barytes, and allowed to cool. From the fluid decanted from the deposit the

nickel is obtained, either by the galvanic process of precipitation, or it is thrown down as an oxide, and then reduced.

When nickel speiss it convenient, it may be treated by the dry way, by melting 100 parts of the same with 20 parts saltpetre and 100 parts feldspath, whereby the cobalt will form into a blue glass. The product is roasted, washed and dissolved in sulphuric acid, and the fluid is then treated in the above described manner. It is of great advantage, whatever system may have been pursued to refine the nickel, to remelt it in a crucible with either yellow or red prussiate of potash before using it as an ingredient for an alloy. For this purpose take for 1,000 parts nickel 50 parts yellow or 25 to 30 parts red prussiate of potash. This process alone is often sufficient to refine the nickels of commerce, if it is run into homogenous well-run bars.

The refined nickel, treated as above, or in some other way, is then melted with the copper, together with charcoal and yellow or red prussiate of potash (which, when used as flux, is said to impart certain advantageous properties to the alloys). When making an alloy which shall contain a great percentage of silver and a small one of copper, so as to be but little oxidizable, manganese may be added to advantage, as nickel must not exceed a certain margin, for fear of debasing the qualities of the alloy. In this case add carbonate or sesqui oxyd of manganese to the mixture of copper and nickel before melting, which has been heated to a glow heat in a covered crucible, whereby a preliminary alloy composed of 80 to 90 parts copper and nickel, and 10 to 20 parts manganese, is obtained. Then melt this product with the silver.

Another very pretty Japanese silver alloy (*gin shi bu ichi*) worked into utensils, was analyzed by Mr. S. Kalischer; it is of a fine grey, almost silver-white color, with a little sheen into yellow, and was composed of 0.12 parts gold, 48.93 silver, 51.10 copper. This grey color appears to be in great favor with the Japanese, and is said to be produced by boiling the articles manufactured of this alloy in a solution of sulphate of copper, alum and verdigris.

Costly Fans.

NOVEL and costly fans are in much request. Some of the most elegant of the newly imported styles are made of white marabout feathers, spangled with gold, silver, seed pearls and some precious gems which glitter and sparkle as they are waved to and fro. The Elizabethan fans are of enormous size, and are used by fashionable ladies who affect antique singularity in dress. Indeed there seems now to be a fashion in fans suitable to any particular style of dress which a lady may choose to adopt. To be carried with the classic Greek costumes are elegant, rich hued fans with characteristic designs and decorations; and ladies who choose the Japanese mode of dress have an unlimited variety from which to select. These Oriental fans are among the choicest and most beautiful of the fans now in use. But the French fan, coming from a jaunty, vivacious, art-loving nation, seems still to maintain a peculiar supremacy which is not affected by her many competitors. The fan is no longer available for some of the uses to which it was once applied: in Shakespeare's time it was made with a long stout handle, and was carried by men, and often employed by *pater familias* in castigating refractory children. In the days of Catharine of Braganza, before the era of parasols, it was used by high dames and ladies of the court as a sunshade, its liberal proportions admirably serving the purpose of the modern umbrella. The fan may not inaptly be regarded as a symbol of civilization. The classic writers of Greece speak of its uses and beauty, while the paintings in the relics of Thebes show that the Egyptians were accustomed to its use. With the spread of knowledge, art, refinement and social and moral culture, the fan has held its way, becoming year by year more beautiful and varied in form and finish, so that the prophecy might be ventured that the disappearance of the fan would be the signal of the world's lapse into a state of ignorance and barbarism. The fan, especially in the hands of a French woman, can be used to entreat, reject, command; to give expression to disgust, jealousy, love, hatred or malice; to hide the blush of modesty, or to serve as a screen behind which she may indulge with a friend in the gossip of the day.

English Watch Repairing.

BY HENRY GANNEY.

(Continued from Page 44.)

LEAVING the subject of tools for the present, to resume it with the various uses they have in connection with the repairing or renewing the different parts of watches, I will take the ordinary low class full-plate Coventry lever, as representing the English work, which most frequently exercises the repairer's skill and patience and makes the greatest demand to secure a performance. The chief fault in low-class levers is that they generate too much friction, and that but a small portion of the motive power is left for expenditure in vibrating the balance, which must have considerable impetus to unlock the pallets. Hence we find strong mainsprings a necessity in this class of work, entailing much wear and damage to the immediate connections. Accuracy in any part of this class of work cannot be taken for granted, and before taking the movement out of the case a suspicious vigilance is desirable, to see that winding and hand-square are free of case and glass, and that the balance, end-stone and screws are free of the case. Most of these watches have brass edges on which the joint and dial are secured, having three feet to secure it to the plate. If the watch has been going any time the joint and three feet are usually loosened, not having sufficient substance, in the brass edge, to endure the strain incidental to winding and opening the watch. Soldering the feet carefully is sometimes done, but a better plan is to put a hollow punch in the vice, which will hold each foot loosely, and with a sharp-pointed three-square punch strike one fair blow with a hammer in the center of the rivet end of each foot. The joint rivets may be tightened with an ordinary round punch. Some care is required, or the dial may be altered in position on the watch, and caution in repinning the dial is desirable, as the pins often project and come in contact with part of the train of wheels.

This class of watch is usually sold with all the latest improvements and a cap is used with it. This calls for some attention, first, to see that the chain and fuzee are free of it—as will be shown by the absence of marks at the respective portions nearest those pieces—and that the balance and cock are also free, and that the plates are not drawn, or the train bound in locking the cap spring. There is usually some rust on the bolt, which requires removing, and the part repolished, to make the watch open and close properly.

The repairer's attention must now be turned to the more delicate parts, with the view of discovering in what direction errors are most patent. If the watch has a strong mainspring and a bad vibration, and the train free, it may be assumed that the escapement is at fault. A very common fault by which the vibration is spoiled, is too much run on the pallets, and the escapement pitched too deep; all run is a serious evil, and no more than sufficient for freedom should be allowed. If, on closing the banking pins, the pallets escape freely and the roller and lever are not free, first try if the guard pin is free with the banking pins closer, and has fair shake when the end of the lever is moved. If tight, the guard pin must be bent back, or the roller edge turned away and repolished, to give the guard pin freedom; care being taken that the pin, though free, is not so free as to pass the roller or to stick; reducing the size of the roller insures its safety, though an impression to the contrary seems to prevail among all makers of common lever escapements, judging by the large radius of roller outside the ruby pin, which is seen in all cheap levers of English, Swiss or American make. Both time and trouble are saved by making the guard roller as small as possible. True theory requires it smaller than the roller pin radius, hence the double roller escapement. Should the ruby pin be unable to leave the lever notch, with the motion of the lever curtailed to that given it by the pressure of the pallets only, the necessary freedom must be obtained by more legitimate means than wasting the motive force in pallet motion and extra locking friction, an evil, in its best form, to be kept within the smallest possible limits in all escapements. If the

lever notch is very deep, removing sufficient with a piece of oil-stone will give freedom, but much care is desirable in making a radical alteration, and jobbers should think twice before removing parts they cannot restore. Putting the roller on a wire and warming it sufficiently to allow the ruby pin to be moved nearer the center of the roller, to make a shallower depth, and if the pin is circular, replacing it with one flattened on the surface, will allow the pin to leave the lever notch with more freedom; and experiments with a brass pin in the roller should also precede any serious alterations. Exchanging a small roller pin for a large oval or flattened one, will diminish the labor required in unlocking, and improve some escapements by changing the engaging friction at the line of center to a disengaging action.

A complete essay on the lever escapement would be required to enumerate all the faults to be considered, but the above is the most common fault and the most easily rectified. A shallow wheel and pallet depth is shown by the recoil of the lever and pallets; but the repairer need not conclude, he must repeat every depth when he observes some recoil on the pallets when they are moved without the balance in. The scape wheel teeth may be bent and cause them to fall, not on the locking face, but on the next pallet. Very fine and low angle pallets are most liable to this fault, as the run is made as little as possible, to secure lightness and celerity of action. Recoiling pallets are not necessarily fatal to the timekeeping qualities of the watch; on the contrary, I have known some of the best lever watches I have come across that owed their success to it. If the lever is very short, and the train slow, it is apt to be fatal, as the recoil of the guard pin is continuous; but if the lever and roller depth is full deep, it carries the pallet over the recoil corner in safety; and I have had so many fine Swiss levers in which the pallets recoiled, allowing the watch to run like a clock without a pendulum, that I am convinced they are purposely made so, as the higher the class of work the more frequent, and in most the rule, Swiss levers and rollers are usually very much longer and larger than English, and the trains much quicker. The power of the train applied through the small pallet and large lever is equally effective in propelling the balance as the short lever; but the pallet, in the matter of recoil, being such a short portion of the lever, with which it is acting, is carried by the lever and roller with such overwhelming force and rapidity that the wheel has not time to exert a recoil influence on the pallet, and the pallet has not the power to transmit it to the roller, which enjoys an amount of guard pin freedom and shake in lever notch, which would be fatal if lever and pallets were more mechanically equal in size and power.

When a large lever and roller are used, the fitting of the various actions need not be so close as when they are small; though the extra weight should be reduced as much as possible by dispensing with all superfluous metal. There is an impression common that the lever performs some of the functions of the balance, and that weight is of no consequence if equalized. This error is self-evident if we consider that the heavy lever possesses a large amount of inertia which must be overcome; unlike a heavy balance which compensates for its extra friction by the greater ease with which it overcomes the locking resistance—though for common watches light balances and light lockings seem to be the most successful. Pallet makers seem to have the idea that the principal purpose of pallets is to keep the wheel secure on the locking face, and to prevent the guard pin from touching the roller. These are the two points which constitute a difference between this escapement and the verge, horizontal and duplex, which have done good service on contrary principles, the motive force being in constant contact with the vibrating medium; and considering the first lever escapement, the rack lever, has no locking, only a dead circular rest, like the horizontal, and that the last lever escapement invented—Mr. J. F. Cole's repellent lever—has a recoil action giving a friction on the balance axis equal to the duplex, it seems desirable to make pallets and levers with the primary object of transmitting the power of the scape wheel teeth,

of which they may be considered extensions, with the least possible loss of power and energy. The amount of trouble involved in neutralizing the effects of heavy lockings has often made me wish the detached lever had never been invented.

A locking under no circumstance is required to be heavy, and its entire absence, and the occasional and constant contact of the guard pin with roller edge, on which it can exercise no injurious pressure, would be less harmful, to even a fine timekeeper, than the intermittent drag which is caused by a powerful locking at every vibration. A circular rest supplies all that is needed for common work; and deep escapements, which are the rule in this work, as being the easiest to execute, would not be so objectionable. The pressure of the wheel on the pallet would keep the lever steady, and plenty of run, in all directions, could be had without the fatal results so noticeable, which defy all the repairer's art. Appliances for making and altering jeweled pallets not being common or profitable to use amongst watch repairers in America, I noticed when there the locking difficulty was considerably eased by altering the angularity of the teeth of common English levers. The retarding influence of lockings often neutralizes the effects of temperature, and in cold weather and when dirty, owing to the balance wheel losing its vibration energy, many lever watches instead of gaining take up a losing rate, owing to the retardation of the balance in unlocking. This is not an unmixed evil; but compensation for lockings, changes caused by variations in oil, and cleanliness, are not arranged for by manufacturers, though they must be combated by repairs.

On the subjects of lockings, M. Saunier makes the extraordinary assertion that they can be made to form a perfect compensation for variations in the motive force, and on page 648 of his "Traité de Horologie" says, "Gradually increase the motive force of a horological appliance provided with an escapement, and a point is nearly always reached when it will cease to perform. Assume the force and pressure increased four-fold, as 1, 4, 16, 64, resistance to unlocking, the same ratio energy of the balance increases as 1, 2, 4, 8." On the strength of these figures M. Saunier proceeds to show or explain the isochronal properties of watches without the fuzee, and, by selecting a suitable mainspring, argues that increase of motive force is neutralized by increasing ratio of locking friction. I am not willing to admit the correctness of the assertion or figures, and fail to perceive how an increase of motive power can give an increase of the locking resistance from 1 to 16 in strength, as a retarding force applied by the scape wheel, and only give an increase of from 1 to 4 as a propelling force; and feel assured locking resistance is only a certain percentage of retardation on whatever force is applied, or we should not perceive increased vibration for every increase of motive force. As a matter of fact I have never been able to stop any watch by any increase of motive power, given by the hand with a key, as much as it would endure without breakage; though in a horizontal watch it is easier to set the balance when a great power is applied. Increased vibration always neutralized that tendency, or a heavier balance, needing a stronger hair spring, would overcome the resistance of the friction. There is a relation between the balance spring and the locking resistance, which may be studied; but as for compensation for motive force, locking resistance, if it can stop an escapement from performing, has no right to exist in what professes to be a detached escapement. M. Saunier's views on the English lever may interest some, who, whilst admitting foreign superiority in horizontal escapements, think their position on the lever escapement unassailable.

"The English lever," says M. Saunier, "as usually met with, can be made by workmen of average ability, for its acting surfaces are somewhat extensive, its scape wheel easily cut; force considerable and balance heavy; and yet it will possess a good rate, that is abundantly sufficient for the requirements of the public. The French escapement demands more care and delicacy of construction, and a more thorough knowledge of the laws of mechanics and hydrostatics; but, when well made, it gives a better and more uni-

form rate, that will remain the same during a longer period, since there is no danger of wear or distortion of the acting surfaces. In conclusion, the advantage is on the side of the French lever."

It is evident from this that French levers are more valued in France than in England, and as M. Saunier gives the English credit for making the best verge and duplex watches, and holds up its own countrymen's work in these watches as fearful examples to be avoided, one can scarcely understand the difference, unless it lies in the fact that M. Saunier has had much to do with teaching the lever escapement to his countrymen, and the verge and duplex were before his time and labors in the cause of horology.

In making alterations and repairs to English lever escapements a frequent use of the depth tool is necessary, as many errors are quickly perceived with the escapement in the tool that will be troublesome to discover in the frame. When practicable, alterations of the pallet stones are best confided to a pallet maker, whose appliances for resetting stones and polishing them will be more complete than the repairer's, though most repairs away from centers of manufacturers can make mills for cutting corners of pallets by charging a brass or soft metal ferrule with diamond dust or bort. The method of charging is very simple: some diamond dust, being mixed with oil, is placed on the flat stake of the vice, and the ferrule placed over and hammered; the diamond dust becomes embedded in the brass, and when mounted on an arbor, with the turns and bow, may be used as a circular file or grinder, against which the pallet may be held and cut. Cutting of pallets may often be avoided by shifting the positions of the stones, which, being fixed with shellac or cement, if warmed will yield and allow the pallets to be moved. Many repairs use spirits of wine for cleaning, which dissolves shellac and most cements, and escapements should not be left in it any time, or the stones will be loosened. Alterations of wheel and pallet depths generally involve alteration of the angling or position of the pallets on the lever, to secure equality in the run and action on each pallet as moved by the roller. Unpinning may not be necessary, but the lever being held edgewise in a suitable recess, a brass punch applied with a light hammer to the pallets will make great alterations of the angle with little trouble or disturbance of existing conditions. Where the holes are jeweled, a favorite plan of altering depths of escapement is the making of an eccentric staff to the pallets. The staff and bottom pivot are made in the usual way, being turned and polished perfectly true; but before making the top pivot, the centre on which it has been turned is filed away and a new point for it to run on is made, so that when in the turns the pallet arbor runs out of tooth or eccentric, the top pivot being now turned and finished in the usual manner. With this staff in the pallets we can make all the actions of the escapement deeper or shallower, or one deep and the other shallow, as its positions in the pallets may be altered to vary both roller and lever depth, and wheel and pallet depth, as may be desired. The correct depth of a wheel and pallet is ascertained by placing them in a depth tool and observing three of the wheel teeth pass freely inside the pallets, and holding the lever lightly with a finger; see that the wheel tooth falls on the inside locking plane as shallow as possible, without raising or falling on the second impulse plane, and that the three teeth have a little shake between the corner of the pallet it has just left and the one it has fallen on. Rather more shake will be required on the outside of the pallets, as the pallets have to move between four teeth, and without fair shake between the four teeth and the outside corner of the pallets, the pallet, though it may escape, is liable to dig into the back of the teeth of the ordinary ratchet scape wheel. The club tooth wheel having substance which allows of the back being hollowed, the inside and outside shake may be equal, and in this respect it is preferable as well for strength and the greater equality of the impulse and locking frictions as the whole of the actions are more concentric. If wheel and pallet are the right size, making the pallet deeper increases the freedom on the inside of the pallets, but decreases it on the outside; and the lever escapement, unlike most others, is most

effective in being made as shallow and light in its actions as possible, consistent with safety. The replacing any part of the lever escapement, if lost, should not involve much difficulty to the repairer, the mounting of the wheel being much the same as every other wheel, except in new work it is usual to rub the brass rivet down with a pointed center, to secure the wheel to the collet; but riveting will be most reliable for the repairer if unpractised, and if unskilled in polishing with grain tin polisher and red stuff, a sufficient polish may be given by rubbing the wheel on the burnishing glass, which is made by rubbing two pieces of glass together, with fine emery and water, and keeping them and whatever is polished on them perfectly clean. These glasses serve the same purpose with brass that the deal burnishing board, charged with emery, does with steel and steel burnishers, and a clean flat gray is, even in new work, always preferred to unflat high polishing, which to be done well requires much application and practice, and is going out of fashion in good work of all nationalities. A clean piece of wash leather must be used to hold the wheel down on the glass, and a light circular rub given, and the glass carefully rubbed clean with the leather. Jobbers never seem to understand the importance of cleanliness in polishing. Red stuff, which in other hands polishes beautifully, is with them no better than oil-stone dust. Burnishing with a clean brush is no use in polishing. Nothing but soft bread, kneaded in the palm of the hand to a dirty paste, and the work to be cleaned imbedded in it, will remove dirt properly for polishing purposes; or if a pivot or arbor, polishing in the turns for burnishing, a clean card scraped on the edge with a knife and applied to the polished surface, will clean and dry sufficient for burnishing, or for observing what progress has been made in polishing.

Baumarchais, the Watchmaker.

YOUNG Caron is a model pupil; attentive to his father's instructions, and making it a point of honor to observe to the letter the rules and conditions he had signed. So rapid was his progress in the watchmaker's art, that before he was 20 he had invented an improved escapement. Elated, he says, by his discovery, he had the folly to explain it in confidence to M. Lepaute, a watchmaker then in much repute. He immediately applied the ingenious invention to his own watches, sent an explanation of it to the King, and advertised it in the *Mercure* as his own. But Lepaute either presumed too much on his reputation, or knew not the character of his youthful rival. A letter from young Caron claiming the new escapement as his, soon after appearing in the *Mercure*, Lepaute replied in so contemptuous a tone that Caron appealed to the Académie des Sciences. The affair having created some stir, the Académie, at the King's request, named two competent persons to inquire into the matter. After a delay of several months, young Caron was declared the inventor, Lepaute, merely the imitator—a certificate from the Académie being also handed to the former to the effect that his new escapement for watches was the most perfect hitherto introduced. This affair gained him some credit with the public, and brought him also into notice at Court. The King desired to see this promising youth, and the gracious manner in which the "*parfait gentilhomme*" received him, and the great interest he appeared to take in his explanation of the difference between the old and new escapements, charmed the young watchmaker. His majesty commissioned him to make him a watch on the new principle, and permitted him to sign himself "*horloger du roi*." This carried with it the privilege of *les entrées* to the Château de Versailles. The elder Caron, naturally, was proud of his *élève*, and he at this period seems to have been as much devoted to watchmaking as his father—who looked forward to seeing him at the head of his profession—could possibly desire. In writing shortly after to a scientific friend in London, Pierre says: I have just had the honor of presenting Mme. de Pompadour with a watch set in a ring. It is but the third of an inch in diameter, and the thickness of the works between the cases but one-twelfth of an inch. It is the smallest watch that has yet been made; it goes 30 hours, and is an excellent time-keeper. It

was probably also the first keyless watch, for a key being inconvenient for so small an object, Caron had invented a method of winding it by means of a small spring round the outer circle of the dial plate. This *tiny chef-d'œuvre* and a curious small dial made for Mme. Victoire, were the admiration of the Court. Their minute and perfect mechanism, examined through a magnifying glass, greatly interesting the King and Mme. de Pompadour, orders for watches on the new principle were so numerous that Caron *père et fils* were nearly ruined by the Court patronage bestowed upon them; for, unfortunately, few of the *grands seigneurs* and *grandes dames* remembered to pay for their watches.

A Costly Filigree Bracelet.

IN a jewelry store in Santa Fe, New Mexico, is one of the most magnificent specimens of Mexican Filigree jewelry to be found in America, and probably in existence. It is a Bracelet of rare beauty and displays the cunning of the Mexican artificers. This Bracelet was made more than sixty years ago, in the City of Mexico, at the expense of four and a half months of labor and \$450 in wages, exclusive of the value of the materials. It consists of a massive piece, shaped like a quarter section of orange peel, and of equal size, from the points of which extend the broad series of ornate pieces that were to clasp the rich round arm of a proud enorita. The whole work is a filigree of pure reddish gold, fashioned in an intricate lace work like a close intertwining of vines and tendrils, and each line of the filigree is elaborately chased and studded with lines and circles and branching sprays of minute round balls or berries of gold, in size from a pin-head to a microscope speck. There are said to be more than 4,500 of these. A thin sheet of gold was cut into a fringe with scissors, then the fringe was snipped crosswise, and dropped into diminutive cubic fragments. These were scattered on charcoal and put in the furnace, where they were speedily melted and ran into polished globules, which were sorted and soldered upon the surface of this masterpiece of Mexican goldsmiths. But the chased and studded gold was not enough. Across the crest of the centre piece of the bracelet flew a parrot, whose head gleamed in blue and green enamel whose back and wings were tinted dove color and pale brown by some process now lost. Beside it two brilliantly enameled lizards eyed each other suspiciously, and everywhere insects and flowers of rich enamel gilded the surface, growing among the golden viney that bore abundant fruit of turquoise and amethyst.

An Ancient Globe.

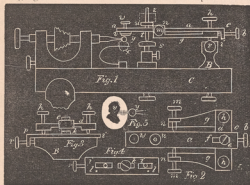
THE Nancy Globe is perhaps the most beautiful of all the ancient globes. It is of rich silver gilt, measuring about 6 inches in diameter, hung preserved among the treasures of the public library of Nancy, France. Its origin is not now known. It appears to be alluded to for the first time by Père Vincent, who, in his "*Histoire de l'ancienne Image Miraculeuse de Notre Dame de Sion*," says that among the precious objects offered to the Virgin of Sion by Duke Charles IV. was a very rich cup, in the form of a globe, which had been converted into a Ciborium. Père Tröstitot, in a similar work, published at Nancy in 1757, speaks of "a very rich cup representing the terrestrial globe, six inches in diameter, in which are perfectly cut and described all the countries, lands, kingdoms, seas, and rivers, as on a mappe-monde, the lands being distinguished from the waters by a beautiful gilding, and a celestial blue representing the waters." * * *

The globe was presented at the shrine of the Virgin upon the occasion of the King's happy return from Germany to Lorraine. It was borne in solemn procession from Nancy to Sion, and there deposited with the Tiercelins. Upon the suppression of the religious houses it was carried back to Nancy and placed in the public library. Some one having proposed to melt the instrument down for coinage, a commission was appointed to decide upon its value. The committee, however, wisely declared that it was worthy of a distinguished place among historic monuments, and provided for its careful preservation.

Gem Engraving.

BY AN EXPERT.

THE modelling has now been described in all its details, and I think if the instructions are carried out the pupil will meet with no serious obstacle. Perhaps the reader may imagine I dwell too much on the modelling; to such persons I would say, if you wish to succeed in the art and attain anything more than a mediocrity, you must first create your idea in a wax model; here you can see your work on an enlarged scale and see it in all lights; get a looking glass and reverse, and alter and shape it in every way to suit you. It is a well known fact that in the execution of statuary the model is the most difficult part—the whole art in fact, the mere chiseling being nothing more than careful mechanical detail. This is quite as true in gem engraving; if you have realized in the wax model the idea, the mere grinding into shape the bit of white onyx is comparatively a much easier mechanical operation than chiseling the marble, where one misapplied blow would destroy the labor of weeks or months perhaps. To resume the details of cutting: a piece of black and white onyx must be selected of the size and shape required. Such pieces can best be obtained of the lapidary, as it would not pay a person outside of the trade to bother with the preparation of such stones. I said black and white, because such a contrast is most desirable; still, for some subjects, a red and white would do just as well. On some rare and highly wrought specimens I have seen the different colors of three separate layers or strata used to produce peculiar effects, but such specimens should be regarded more as curiosities than as works of high art. In selecting a stone to engrave the two essential features to be observed, or rather borne in mind, are: first to select a stone in which the black is a very dark brown; second, let the white be as dense and opaque as possible. It is a frequent fault of onyx to have a layer of white next a thick layer of black, which is not a pure dense white, but of a sort of translucent milky hue, too blue in fact; discard such specimens. Let the line of demarcation between the white and black be sharp and positive, and the white portion be pure and dense. Good stones are plenty enough; it is only the care and trouble selecting them. The pupil will experience a difficulty in cameo engraving which did not present itself in any of the former modes described, and this is because he can use no definite outlines; he must rough out the masses, gradually shaping, and if any doubt comes up have recourse to his model and proportional dividers. But the skill experience will get from modeling will make itself felt here. The pupil will soon discover the similarity that really exists between what at first seems such entirely dissimilar substances; the tools are different, but the general method of procedure is the same; in the wax a rough general form of a head was first shaped out but no de-



tails; in cutting the gem the surplus stone is ground away, leaving a similar rough semblance of the head, and the cutting is continued, using more care and finer instruments until the details are all made out. True, the tools are quite unlike, but the mode of procedure is the same. Copper balls as large as small marbles and charged with diamond dust can be advantageously used in cutting, away such

portions as surround the head; the depth of such cutting is easily determined by the black background making its appearance gradually. For such coarse cutting use a piece of very fine soft sponge in a loop of wire, the wire acting as a spring to hold the sponge against the copper ball cutter, the sponge to be kept wet, of course.

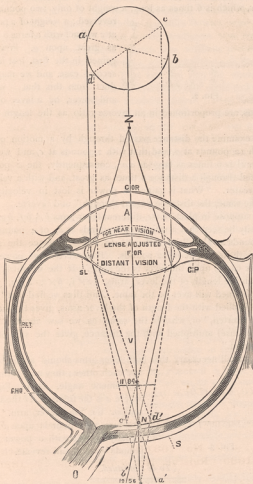
A guide for grinding flat surfaces with a globe cutter, is made as shown at Figs. 1, 2, 3 and 4. This is shown as connected with an American lathe, but a very little ingenuity will adapt it to any kind of lathe. This arrangement can be made at a little expense, as most of the parts are made of No. 12 sheet brass; the block B can be of brass or cast iron. The piece *a* is of sheet brass $4\frac{1}{2}$ inches long by $\frac{3}{4}$ wide; this piece is bent at the end, as shown at *c*, and serves as a lip for the screw, *b* to work through; a screw is capped into the lip of *a*, and abuts on *d*. The piece *a* is attached to *d* by the screw *c*, but there is a friction washer under the screw head, so as to permit the screw *c* to slide in the slot *f*. The piece *d* is $\frac{3}{4}$ of an inch wide, $2\frac{1}{2}$ inches long, of sheet brass, and pierced with two screws, *h*, *h*. The screws are cone pointed, and go into the pits *l*, *l*, Fig. 4. The pieces *g*, *g* are soft soldered to the piece *d*, and bent up at *n*, to let the screws *m*, *m* through. These screws move the piece *a* sidewise in adjustment, but should not be set so tight as to prevent the screw *b* from moving the piece *a*. The piece *i*, Figs. 3 and 4, is $2\frac{3}{4}$ inches long and bent at *p*, as shown in Fig. 3, to allow the screw *r* to be tapped through; the plate *i* is attached to the block B by the screw *k*, and prevented from swerving by steady pins in the holes shown above, *l*, *l*. The screw *r* moves the piece *d*. There is a friction washer under the screwhead *k*. At *s* is shown a disc, or table, which can be put into the tool rest of the lathe, as shown in Fig. 1; this table can be flat or convex on the upper surface, as it is intended to guide or control the stone to be cut, by the action of the screw *t*. The gem to be cut is shown at *v*, where it is cemented to a movable block, and held by the screw *w*. In Fig. 1 the globe cutter is shown to do the work is shown at *y*, and at *x* is shown a small sponge to keep the cutter wet, which is supported by a piece of bent wire, as shown. Such a machine as described above can be made in a short time, and removes from the engraver a great deal of watchfulness in those parts which need only to be removed. In using it the stone is cemented to the piece *v*, and fastened by the screw *w*. The block B is secured to the lathe, as shown, with a screw below it, and the points of the screws *h*, *h* are inserted into the pits *l*, *l*. The machine is now in position, as shown at Fig. 1. By means of the screw *t* the gem can be permitted to approach the cutter *y* to a determined depth, which is supposed to be entirely through the white, as in this case we are about to remove the surplus white layer from about the head. If the face of *s* is rounded or convex, of course as the screw *b* is turned, the gem will be drawn over the cutter *y*, and by the action of the screw *t* produce a similar curve. It will be seen that the screw *t* prevents the cutter from acting below a fixed depth. The screw *r* controls the movement of the gem in a direction at right angles to the screw *b*; consequently, by means of these two screws, the stone to be engraved can be moved in any direction. To illustrate the mode of using, we will suppose the screw *b* is drawn out until the lip *c* can be pushed up to the plate *d*. First draw in the head of the screw *b*, and push the piece *a* as far forward as you can. The cutter and gem, if looked at from below, would be seen in the position shown in Fig. 3. The copper globe cutters should have their necks small enough to permit the work to pass over; and the globe only made of copper, the neck and screw should be of tempered steel. The gem should have a rough form of the head to be cut painted on with shellac varnish and lamp-black, as shown at Fig. 5. Start your cutter into a rapid motion, and turn the screw *b* very slow—you can feel when the tool is not cutting; let the cutter advance until it runs a little into the black silhouette of the head. Retract the screw *b* again; and push the piece *a* forward again; turn the screw *r* a little, and repeat with the screw *b* the cut you have just made. By such repeats the entire surrounding surplus white portion of the gem can be brought to a general surface cut a little way into the black, and this surface either flat or convex. The only objection to this method is, it leaves the surface in minute ridges, but these soon disappear under a flat-faced cutter, and the result is a true, flat surface, or, what is better, a convex surface, which is true as a lens. This instrument is almost indispensable in letter cutting; and it is for this purpose the screws *m*, *m* are used. I suppose it is hardly necessary to point out to the reader the facility with which the work shown in Fig. 2 can be removed to examine the progress of the work, and it is bound to go back exactly as it was. By means of the screws *n*, *n* the face of the gem can be adjusted so the cutter will remove equally all around the head. This can be used over the entire gem in roughing out, but the final finish must be by hand.

(To be continued.)

The Detection and Correction of Visual Imperfections.

THE above is the title of a book just published by the Spencer Optical Manufacturing Co., and which supplies a long-felt want. It will undoubtedly be generally accepted and warmly welcomed by all who are interested in the optical defects of the human eye. Its author, Dr. C. A. Bucklin, has given a clear and intelligent consideration of a long list of extremely practical and interesting subjects in the very limited space of seventy-five pages, requiring no previous technical knowledge to be readily understood. It is based upon a hospital experience of five years in Austria, Germany, England and New York, and a perfect familiarity with the literature of these countries on this subject. He has illustrated the anatomy and every correctible visual imperfection of the eye in a single diagram. It contains the standard visual tests in universal use, the price of which alone formerly exceeded the price of the entire work. A list of the contents, a specimen of the illustration and visual tests will do much to recommend this hand-book to the practical mind. It enables the physician to make a qualitative diagnosis in cases of suffering from weak eyes, headache, etc., and enables the optician to judge more correctly of the nature of the trouble with which he is dealing.

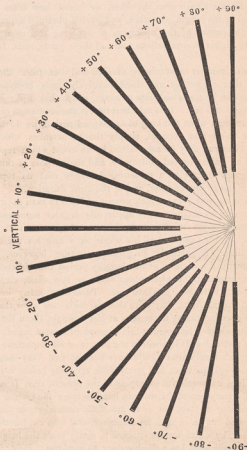
THE FOLLOWING DIAGRAM IS GIVEN AS ILLUSTRATING THE ANATOMY
AND ALL CORRECTIBLE VISUAL IMPERFCTIONS.



The following is a brief synopsis of the table of contents: Diagram of Human Eye showing all correctible visual imperfections; General anatomical description of the eye. The nature and elements of a lens; the theory of vision; acuteness of vision; chromatic aberration. Effects of color on distance; accommodation, or near and distant vision; visual tests, near sight, far sight, old sight, weak

sight; "bad sight," astigmatism; nature, cause and correction of near-sightedness; false near-sightedness, or spasm of the accommodation; nature, cause and correction of far-sightedness; dependence of convergent squint upon far-sightedness; presbyopia (old sight) nature, cause and correction; asthenopia (weak sight), amblyopia (or bad sight); astigmatism—practical hints on inflammatory and other affections; construction of spectacles in general—the old or inch system and the new or metric system; test text for near vision; radiating lines used in testing for astigmatism; test type for distant vision.

THE ANNEXED DIAGRAM IS AN ILLUSTRATION OF THE ASTIGMATIC DISK.



To one having a spherical cornea these lines all appear equally dark. When the cornea is ovoid with the sharp curve in the vertical meridian, the horizontal lines will be the blackest till the curve is so sharp that the magnification blurs them, then the vertical lines will be most distinct, and the horizontal lines will appear blurred. Those having weak eyes as a result of unequal curves in the cornea, can only have the defect remedied by having special cylindrical lenses ground to correct the faulty curves.

Polished steel may be beautifully gilded by means of the ethereal solution of gold. Dissolve pure gold in aqua regia, evaporate gently to dryness, so as to drive off the superfluous acid, re-dissolve in water, and add three times its bulk of sulphuric ether. Allow to stand for twenty-four hours in a stoppered bottle, and the ethereal solution of gold will float at top. Polished steel dipped in this is at once beautifully gilded, and by tracing patterns on the surface of the metal with any kind of varnish, beautiful devices in plain metal and gilt will be produced. For other metals the electro-process is best.

Guide for Watchmakers' Apprentices.

WE commence the publication this month of a translation made expressly for the *JEWELERS' CIRCULAR*, of the prize essay by Hermann Sievert, under the above title. It is written for apprentices, and consequently will be found elementary by the advanced horologist. Being, however, a work of undoubted, first-class merits, we caused it to be translated into English, hoping that the mature mind also will find many points of interest therein. We omit the preface and general introductory and commence with the second chapter.

ON CLOCKS IN GENERAL.

Introductory.—Length of surface is spanned and ascertained by a known quantity called measure. Laying this known quantity uninterruptedly one length after the other, we count how often it was contained in the length of surface, and having obtained a quantity of units in the pursuit of the operation of applying the measure, we raise it to higher denominations and call them yards, rods, furlongs, miles.

In such a manner must time be divided and measured. The measuring of time cannot be explained positively, only comparatively, and there can be no actual time measure, which like a physical one, may be seen and felt. It is said that time is the succession of events, of occurrences; when thinking of an elapsed period, we do not take the time itself into account, simply the occurrences which took place. Time can only be ascertained by an event which repeats itself with an uninterrupted uniformity, and the purpose of this event, it is chosen to serve as a measure, demands that its repetitions shall be equal to one another, and of the same duration.

The first natural event which prompted itself to man as a fitting time measure, on account of its apparently regular recurrence, was the change of night and day, and the count from sunset to sunset has for a long time satisfied all his wants as a unit for the calculation of time. A gradually progressing culture, however, after a while demanded a division of this lengthy period into fractions, for which purpose many contrivances, such as sun dials, clepsydres, obelisks, etc., were brought into use. Possessing many imperfections and irregularities, they were thrown aside one after the other, until the ever increasing necessities at last brought about the invention of the wheeled timepiece; this triumph of human ingenuity and ceaseless research. It lies within the nature of all important inventions that this mechanism should have been at first very imperfect, and much work, patience and study were requisite before it reached the zenith of its wonderful exactness of the present day. It is irrelevant to the purposes of the work in hand to trace the course of development step by step, but let us gratefully remember our ancestors, who elevated our art to such an eminence, and who cut out the steps for our feet, by which we are enabled to easily scale the height.

Such a mechanism has a double duty to perform. First, it must cause a certain recurring event, at regular periods, and secondly, it must count these events, add them, and raise the sum to a higher denomination. This recurrence, which in duration is the smallest fraction of time, consists in our watches in a circular movement made by a round body, and called vibration, by means of which the elapsing time is measured; and as we apply the measure of length anew, where we left off last, these vibrations must succeed each other uninterruptedly. As said, the addition of these vibrations is the second duty of the watch, and is accomplished by the wheelwork, which parts a certain number into seconds, minutes and hours, and indicates the number obtained on the dial plate by its hands.

The wheelwork has yet another task. Each motion requires an application and consumption of power for its continuance, to overcome the ever present friction. A wagon set in motion will not continue in its course forever, but it will gradually lose the impetus imparted, and at last has to be drawn; in like manner must new force be applied to the vibrating body within the watch. This power is imparted to the movement by the winding of an elastic spring, and it is the second task of the wheelwork to gradually dole out this re-

served power in equal quantity during a certain period. That part of the work directly charged with supervising and dealing out this power, and to permit its gradual waste, whereby the rotary motion of the wheelwork is caused, is called the escapement. Its construction varies with the quality and purpose of the watch. This escapement being the most important part, it is necessary for us to give it our undivided attention. The wheels act alike in all watches, and in their construction and application are subject to a natural law, the law of the lever. Since it is our purpose to examine a watch both theoretically and practically, let us make you acquainted with this law, that you may understand its condition and its bearing upon the wheelwork.

The Lever.—Imagine a c (Fig. 1) to be an inflexible bar, supported in its center by b , this is an equal armed lever, because the arms ba and bc are of equal length. A weight of 12 pounds pressing upon the extremity of one arm, operates with the same power at the end of the other.

By a motion of the lever, both extremities will move with the same velocity and through the same distance. Things, however, will assume a different proportion by a lever with unequal arms, as is shown in Fig. 2; b is the fulcrum, ba the short, bc the long arm. A pressure of 12 pounds upon a will counterbalance upon the end of the arm c , which is 6 times as long, a weight of only two pounds, or reversed; a weight of 2 pounds at c will act with a force 6 times as great upon a . Power is gained in the first, lost in the second case, and we may deduct from this that "weight and power, by a lever of unequal arms, are proportioned in an inverse ratio as the length of its arms."

Let us examine the distance passed through by a motion of the lever with 12 pounds at a , and that with 2 pounds at c , and we will find that cc' is 6 times as large as aa' , consequently, the 2 pounds have passed through a distance 6 times as great, and with a velocity 6 times greater. "What is gained in power is lost in velocity, or what is the same, the distance passed through," and reverse.

Let us suppose in place of bc , different lever arms bd , bf , bg , and it will easily be seen that a weight of 6 pounds at d , of 4 pounds at f , of 3 pounds at g , will be sufficient to counterbalance the small lever ba with its weight of 12 pounds. The exertion of power (in these three cases) upon the lever is the same. If the weight is multiplied with the length of the lever arms, 12×1 , 6×2 , 4×3 , 3×4 , the sum obtained will ever be the same. And thus we find that "The weight multiplied with the length of the lever arms, gives the sum of the power exerted," or, what is the same, as we saw above, "The weight (pressure) multiplied with the distance, gives the sum of the power exerted."

It is not at all necessary that both lever arms should stand opposite each other; they may form any convenient angle, as in Fig. 3, where a is the fulcrum, ab the short, and ac the long lever arm. The pressure of 12 pounds upon b will equally operate with a power of 2 pounds upon c , and reverse.

(To be continued.)

Means of engraving on steel.—Lightly heat the metal, and cover it with a layer of beeswax; hold it over a smoking flame, to blacken the wax, to better see the lines desired to be drawn upon it either with a pin, pen or point. This done, run azotid (nitric) acid diluted with twice its volume of water, over the lines laid bare. Be careful to spread the liquid of a uniform thickness. The operation will be finished in about three minutes.

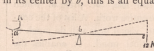


FIG. 1.

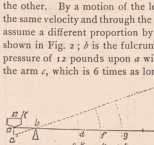


FIG. 2.

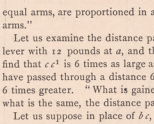


FIG. 3.

The Travelers' Club.

ON one of the raw, cold days of the month just past—when the April showers, instead of partaking of the usual "balminess" of spring, shared the frigid coldness of an iceberg—there chanced to assemble, about lunch time, in a well-known English chop-house in John street, half a dozen commercial travelers for as many different firms. Their meeting was entirely by chance. It was a dreary, dismal day outside, with the wind blowing coldly, a drizzly rain falling, and the atmosphere at that point of dampness and juiciness when it penetrates to the very marrow and chills the body through and through. There being no business to be done for their respective houses, these traveling salesmen had dropped into this favorite haunt of theirs for a hot chop and a mug of Bass's best, for which this house is noted. Almost any day, between the hours of 12 and 2 o'clock, one or more members of jewelry firms, salesmen or travelers, may be found enjoying their mid-day lunch at this house, usually in a most hurried manner, for time is precious to them, and, in business hours, they are wont to appease their stomachs with a bite and a promise. But on this particular wet and drizzly day, no one felt in a hurry, and all were willing to treat the "inner man" with more than usual consideration. So when Flavius Jones, traveler for Burton, Snodgrass & Co., dropped in for his lunch, he found seated at a cosy table in a cosy corner, his friends Charley Hawkins, traveler for Pond, Rogers & Jimminy, and Billy Bowers, road agent for Slaughter, Bonus & Co. These worthy gentlemen were leisurely disposing of their hot chops, and Flavius was cordially invited to a seat at their table. The three worthies were competitors on the road, but royal chums in social life. They had not met for weeks, and their last interview was on a railroad train that had come to a standstill in a six-foot snowbank on a Western prairie. They had then spent a dismal day in company, but immediately the train had been relieved, they had separated, each going his way, and had not met again till chance brought them together on this cold, chilly day, in the warm, comfortable room of the chop house. Jocular greetings were exchanged. Flavius ordered his chop and "something hot with a bit of lemon in it," and the three bestowed themselves for lunch and a pleasant chat.

Scarcely had they finished their meal when there strolled in Johnny Long and Ben Snediker, also travelers for jewelry houses. Being well-known to the three already so comfortably housed, they joined their party, and all were soon jovially discussing their adventures on the road, the state of trade, and relating jolly anecdotes of the men and things they had encountered on their travels. After the substantial had been disposed of, cigars were brought, also more beverages, and the quintette was enjoying itself right royally, when in popped Frank Popham, as it shot from a gun. Frank is also a traveling salesman for a jewelry house, is one of the most vivacious of talkers, short of stature, quick, nervous and jerky in his movements, and as full of fun and jollity as a dog is of fleas. Frank's bosom friend and constant companion, when in the city, is Joe Watkins, the exact opposite of Frank in everything—phlegmatic in temperament, slow of speech and of motion, large, corpulent, and wheezy with asthma. Joe was formerly a traveler for Pepperill & Bro., manufacturing jewelers, but having served his time on the road, and being too stout and short-winded for such active work, he had been advanced to a junior partnership in the business, and now devoted his attention to office work. On this occasion, as usual, Joe followed closely in Frank's rear, puffing and blowing like a full-fledged porcupine. The pair were enthusiastically greeted by their fellow travelers before mentioned.

"That's a lovely pair to draw to," was Snedicker's greeting. "Come in, fatty, and take a chair."

"This pair would make you a full hand," slowly replied Joe, and being intimated to the waiter that he would take his "as usual."

"Funny thing, this," said Charley Hawkins, "that seven of us travelers in one line of trade should all accidentally stumble into this place unexpectedly at the same time."

"You are expected to stumble any time," retorted Popham, in his short, jerky manner, "especially after dim."

"Oh, hush!" exclaimed Johnny Long, who prides himself on knowing and using appropriately all modern slang. "It wasn't your put in. Charley has got something to say—let him say it."

This remark excited curiosity all around, and there was a universal demand that Charley should at once relieve his mind of anything that oppressed it. Being much importuned, he said:

"Boys, I have got something to propose to you, but first let the waiter duplicate the last order, for I never can talk when my throat is dry."

"Bravo! bravo!" exclaimed most of his hearers, while Johnny Long shouted, "Bully, Ebenezer! now we smile."

"Waiter! you must vill my glass to der top up dis dime; der vas do much emptiness in ut dot last time," said Snedicker, who delights in speaking broken Dutch, and interlards all his conversation with it.

"Und waiter! I shay, you hurry up mid does drinks, vor de poy's vas dyin' vom der draught."

"Sure, I've a throat on me longer'n a giraffe, an' the whole uv it's as dry as a limekiln," cried out Joe Watkins, in a rich Irish brogue, which he employs to great effect when he is in a humor to have a good time. His wheeziness and corposity lends a most ludicrous effect to his Irish, which he rolls off slowly and with great unciousness.

Other admonitions to accelerate his movements induced the waiter to put in an appearance with seven brimming Toby's of ale, and some fragrant Havanas. Watkins acknowledged the receipt of his beverage by pouring it from the mug to his glass, and watching with a loving eye the bubbling liquid, while he trotted forth with sharp Irish accent, these lines of an old English ballad:

"Back and sides go bare, go bare,

Hands and feet cold,

But belly! God send thee a plentiful share

Of jolly good ale and old."

Cigars being lighted, and all eager to hear what proposition Hawkins had to make, that individual relieved himself as follows:

"Boys, as I before remarked, it is a funny thing that seven of us travelers for New York jewelry houses, who scarcely meet twice a year except on the road, should all chance to be in New York at the same time, and should meet at this place without any arrangement for so doing, and entirely unexpected to each other. When I am in the city, here's where I come to lunch. So it was not surprising that I should be here. Probably the rest of you have the same reason for being present. But the fact that we are all home at the same time is a most surprising one. I ought to be off on my Southern trip, some of the joy of you should be in the West, and I certainly expected to meet Billy Bowers in New Orleans this week. I suppose the reason why we are not on the road as usual at this season of the year, is because the West is buried in snow and business frozen up; while the South has been deluged with rain, and now rests under a soft blanket of mud. Traveling is almost impossible, and trade has been so dull with our customers that it would be no use visiting them now if we could. At least, that is the way the house I represent looks at it, and I suppose your employers see things in the same light, which accounts for us all being in the city at this time. But, if it is a fact that the South is suffering because of too much liquid, that is not the case with me. I never made so long a speech in my life, and I suggest that a lubricator—such as lubricator would be acceptable. Ah! friend Jones takes the hint. Flavius, I will drink your health when mine arrives. But to continue: Having satisfactorily accounted for our being here, I propose that we improve this auspicious occasion to inaugurate something that shall make our names known to fame and this eventful gathering memorable for all time. I am looking at you, Flavius."

"This is good old ale, drink it down," chimed in Watkins, asthmatically.

"I agree with Hawkins," responded Flavius, "and suggest that we celebrate this remarkable event by going to Niblo's Theatre to-night to see the Black Crook."

"Oh! the haythen! Just listen to him!" said Watkins. "Its the girls he's allus after. Oh! Jones, my boy, you must mend your ways or you'll ruin the reputation uv our profession."

"Oh! it's the *leg*-itimate drama he wants to see," remarked Billy Bowers.

"Vy dond you vellers keep quiet, and let Hawkins talk his mind out. He dond zay much sometimes, but now he vants to dalk vy you dand let him? And ut?" said Snedicker.

Thus admonished, the boys again became clamorous for Hawkins to proceed, and he resumed his discourse.

"If you'll keep quiet a few minutes I will disclose what is running in my mind."

"What he calls his mind," said Popham, in a stage whisper.

"What I have to propose," continued Hawkins, "is that we, the enlightened road agents now assembled, do immediately organize ourselves into a club; that we have meetings once a month; that we

admit to membership only members in good standing of the distinguished army of professional travelers in the jewelry trade; that former travelers who are still in the trade in any capacity be admitted as honorary members. The object of the club shall be the cultivation of friendly feelings between the members of the traveling army of jewelry salesmen, more intimate social relations, and the interchange of those enlarged and comprehensive ideas for which we are remarkable as a class. There is a world of good fellowship among us, and it should have an opportunity to display itself. It needs vent. Such a club as I have suggested will serve as an escape valve for the chunks of wisdom that now burden our intellects. What say you, gentlemen, if you will permit me to call you so, shall we organize a Travelers' Club?"

"Hear, hear," shouted the boys. "It's a good idea. Let's have a club of our own."

"How can we organize a club," said Billy Bowers, "when we are seldom in the city, and consequently, couldn't be here to monthly meetings."

"I've thought of that," replied Hawkins, "and don't think there will be any trouble on that score. We shall have fifty or sixty members, if not more; two of them will be in the city every month, and I propose that two or more shall constitute a quorum. Meetings must be held regularly, and those who can't attend can contribute a story, an anecdote, or relate some adventure which he has had, and thus add his portion to the proceedings of the club. The boys generally are good story tellers, they see lots of life, meet many queer people, and their observations of men and things are worthy of being preserved. Now, having suggested the idea, I am going to assume the duties of temporary chairman, and put the question—shall we have a club?"

"I call for the yeas and nays," popped in Popham.

"Shall the yeas and nays be called, gentlemen," asked Hawkins, flourishing his empty glass in place of a gavel, and without waiting for a response, he declared the motion lost. "The question now recurs, gentlemen—shall we have a club? All you in favor of it say aye."

"I'm wid you, me boy," said Watkins. "Clubs was ellus a favorite trump uv moine."

"I vote for a club, and receptions," responded Jones.

"A club is just the persimmion I'm pining for," answered Johnny Long.

"Vell, I guess dot will be a good ding, poys, and I goes vor it, but I want it understood dot dere is to be no taxes, und efery man haf as mooch beer vat he like."

"And every man pay for all he drinks," said Popham. "This suits me. I'm in for it. A club is what is wanted to obtain for us travelers proper recognition in the trade. We're hiding our lights (also lives) under a bushel. Let's trot 'em out under clubs."

"That reminds me of a little story that will fit in here," said Billy Bowers, who never missed an opportunity to tell a story. "When President Lincoln was traveling in Ohio—"

"Oh! shoot the story—we're making history now!" exclaimed Johnny Long.

"Gentlemen, as you have all voted yes, the question is decided in the affirmative, and your all is club."

"The babe is born; let's christen it," said Popham. The chairman *pro tem* decided that christening was in order, and called for suggestions as to what title should be selected for the new organization.

"I propose," he said, "that as this is to be an organization for the diffusion of knowledge throughout the trade, that we call this organization 'The Traveling Jewelry Salesmen's Society for the Propagation of Enlightened Ideas Pertaining to the High Art of Gold and Silver Work, and the Dissemination of Statistical Information—'"

"To be continued in our next," put in Billy Bowers. "A title like that would sink the Great Eastern. Now, I propose something short and expressive for a name—say the Chinniers' Club—that is both alliterative and to the point. I remember when I was a beardless youth, and was sent out on my first trip, I got down in Kentucky, and there met a fellow who belonged to a society that—"

"Choke him off," broke in Johnny Long. "I suggest we call this organization the Cuckoo Club. I don't know that it has any special application to us, but there's no snide about it. Why not Cuckoo as well as Lotus?"

"Lotus have no more nonsense about it," said Snedicker. "Von name is shust so gut like anudder von, if you can any speak out at von mouthfull. I move dot we call dis der Donnervertelafinstenierblatvonkimmel und—Gott von heime! who vas dot drowed dot cracker my eye in?"

"Gentlemen," said Popham, "let us have a name that means

something, and suits our profession. We are all travelers; we're on the go most of the time; let's call ourselves Peripatetic Perambulators."

"Does he think we're all baby carriages?" asked Joe Watkins. "Luk at me—ain't I a healthy specimen of a peripatetic perambulator. Better call ourselves itinerant itinerants, and done wid it."

"Mr. Chairman," broke in Jones, "I move that we call this simply the Travelers' Club. All those in favor of the motion say aye. It is a unanimous vote, and this society will hereafter be known as the Travelers' Club."

"Well, gentlemen," said the temporary chairman, as he held his empty glass significantly against his starboard eye, "Our friend Flavius has decided the matter, and it is now in order to wet the christened child with some more beverage. Fill your glasses, and we'll drink success to the Travelers' Club."

The ease and readiness with which the suggestion was complied with indicated long practice on the part of the newly-made members.

"You done got dis club organized, vot you goun't to do mit um," asked Snedicker. "Eef I vos a member, I want to know vat I must do. I moof dot we elect some ovicers, und I nominate myself vor dresurer."

"The member will come to order," said the chairman, as he broke his glass hammering on the table. "No officers can be elected till we have a constitution and by-laws, and I appoint Billy Bowers a committee of three to draw up a constitution and by-laws to present at our next meeting, which will be held at this place four weeks from to-night."

"Let's have more members, and give 'em all notice to be here," said Jones. "As Joe Watkins lives in the city, I move that he be instructed to invite all traveling salesmen for jewelry houses to become pilgrims, and to be on hand at the next meeting."

Motion put and decided to be carried, although nobody voted.

"Now, gentlemen," said the chairman *pro tem*, "I think we have got this thing fairly started. Hereafter, when we come in from the road, we shall have a headquarters to come to. Some travelers will always be found here or whereabouts. I have no doubt but this club will be a success. At its meetings we shall cultivate closer social relations, and, with our feet under the club's mahogany, we can swap stories with each other, and keep ourselves posted as to the condition of the trade as we find it. If there are any lame ducks dropped in our travels, here is the place to report the fact for the benefit of all members. We can inform each other as to railroad routes and hotel accommodations, and when anyone finds a mean, sneaking hotel man, here is the place to post him. But above all, I urge upon you to cultivate the social side of your natures. As business men, we have altogether too little relaxation; we get to running in ruts of business, and our brains ossify in the service, because we do not for a moment forget that we are a part of the machinery of the factory, wound up and expected to run as long as the mainsprings lasts. Let us remember that we are men, with kindly feelings to all the world; that we have human hearts and human sympathies. As members of this club, let us forget our business cares and anxieties, and each strive to develop in himself and his fellow members the humanity that is in him—his social nature, and that touch of nature that makes the whole world kin." To this end, I invite you all to be present if you can, and to bring as many of our class with you as possible. To you and to them I say, if you can't come, send some contribution in the way of a story, anecdote or adventure that may be read here for the instruction and entertainment of your brother travelers. I see that, as usual, all your glasses are empty, and I appoint Joe Watkins a committee of one to have them filled at his expense."

"Go aisy, Mr. President," said Joe. Remember you're only President *pro tempore*, an' don't be givin' your orders so glib and foine like. I've no objection to treatin' the party in the least, and am thankful we're not in Wisconsin, where they arrest a man for treatin' or bein' treated. I tell yer, byes, that's a good State to keep away from till they repeal that law, for its dry you'll go as long as you stay there. What ignoramuses them legislators must be to pass a law to destroy conviviality and sociability like that. Do they think a man's a camel, that he can go three or four weeks without drinkin'?" Fill up the glasses, waiter, an' we'll drink success to the Travelers' Club and confusion to the Wisconsin non-treatin' law."

"Before we adjourn," said Popham, "I desire to move that THE JEWELERS' CIRCULAR be appointed the official organ of The Travelers' Club, and that Dan Hopkinson be made an honorary member, with the privileges of the floor."

"Carried unanimously," announced the chairman. "And now, the glasses being empty and the cigars out, I declare the first meeting of the Travelers' Club adjourned."

Alloying and Coloring Gold.

BY G. H. GEE.

From the Goldsmith's Handbook.

IN melting gold it has been recommended to employ small lumps of charcoal as flux. There is no possible advantage in such a method or manner of treatment, for the use of flux at all is to prevent the molten metal from becoming oxidized on the surface, which it does when heated in the presence of a current of air. Now the object of employing flux is not so much to assist in promoting the fusion of the component parts of the several alloys as it is to prevent oxidation taking place; hence, we repeat, to prevent *which* effectually the surface of the gold and alloy in the pot, when it reaches the molten state at least, must be absolutely secured against currents of air, and especially those which are to be found in all jewelers' melting furnaces; and if such precautions are not regarded, oxidation, loss of metal, and unworkable gold is the general result. Now, what is oxidation? It is the operation of converting any metallic substance into an oxide, and oxide in chemistry means a compound of oxygen and a base, and not being in an acid state may be called metallic rust. The oxygen being an electro-negative element, constituting the vital part of the atmosphere, attacks the copper first, which is the weaker element of alloy, and brings it under its influence, and so forms what is called the *katz* in conformity with chemical science. To put it plainer, we should say the action of the air upon molten metal without a protective coating destroys its homogeneity. Altogether we do not wish to be understood to convey the meaning that a slight oxidation of the surface of molten gold renders every part of the bar unworkable, as that to a great extent depends on the pouring of the mass into the ingot mould. If the oxide, which appears like a scum on the surface, is prevented from going into the ingot mould with the liquid mass, then the gold may be perfectly workable; but assuming this to be very generally the case, a great loss of material has taken place, and a remnant left behind which might as well have been in the bar of gold, and which would have been had oxidation been prevented at an earlier stage of the process. When this oxide—or nature-destroyed gold—runs into the ingot mould, it either appears upon the end of the bar of metal in a corrugated mass, or, on the other hand, it forms what to all appearance seems like little circular discs of unmetled metal, the unmetled portion forming semi-detached scales which subsequently roll into the gold and destroy its smoothness and clearness. Now all this may be prevented by using the purest vegetable charcoal as flux, and well stirring the melted alloy before pouring. The flux is best added on the verge of commencing fusion, as oxidation takes place very rapidly at this stage of the operation of melting jewelers' alloys, unless a suitable covering is given to the surface to keep away the air, which is the promoter of oxidation.

Sometimes ingots of gold turn out of the mould with a serrated edge or edges; this is due to sundry causes, which may also be avoided by the acquisition of a proper knowledge of all the general details connected with a process so uncertain in its action; for there are very few jewelers indeed who have not experienced some trouble and annoyance in this special part of their trade. We have met with these obstacles in our business, and we can therefore speak of them with that amount of *real practical* knowledge so absolutely essential to the production of a treatise like this, which only aims at the dissemination of really useful practical information to the gold-working trade. The causes which lead to these serrated edges will be here explained, and as a matter of necessity the best remedies will be given, together with such other information which is likely to be of service in the preparing of perfect bars of alloyed gold. Imperfect bars of gold usually roll with a more extended jagged edge as the process proceeds, and consequently causes a great deal of waste in the trimming of the edges when used in sheet gold, and when in wire the outside strips break into short pieces of a few inches in length in the slitting of them. One of the causes of these imperfect bars is through the badly mitring of the ingot mould; it may admit the air,

which always causes serrated edges, spitting and loss of metal. Again, the ingot mould may *even* be mitred properly, and yet not throw out a perfect bar of metal. This may be owing to a little grit getting between the parts which should meet securely together, so evenly, in fact, as to render the mould perfectly air-tight. Occasionally new ingot moulds warp when heated. The remedy in such cases would be a re-grinding of the surfaces which meet each other, or otherwise a thick coating of whitening made into a paste with water and applied to the parts which admit the air. Again, when the ingot is not sufficiently well heated, defects in the casting will also appear; it is the same when the heat given has been too great. The right heat may be ascertained by throwing a few drops of water on the mould, when, if it rather quickly boils off, it may be used with every advantage and safety. Finally, the heat must be much greater than can be borne by the hand.

New ingot moulds should be well greased before using, to prevent the gold adhering to them. It is much better to close them up and pour in a solution of salt and water, and let it remain for a day or two before using them; this causes oxidation—or rust of the surfaces—and is an excellent preventive to the gold sticking, which is sometimes found to be so obnoxious as to cause chipping of the mould, thus rendering it useless for further operations.

In badly prepared moulds a porosity is given to the gold in the casting, apart from other considerations, and it is clearly discernible before the rolling process takes place. The inexperienced may detect porosity readily enough, when once having seen a bar of its kind, by the unevenness of surface, which is sunken in, in places upon the upper side, and exhibiting numerous small cracks and blow-holes, all caused by a current of air meeting the molten metal as it is poured and proceeds down the mould prepared for its reception. When gold and its alloys are imperfectly fused a long point is generally left adhering to the end of the bar, and these porous irregularities show themselves also in the form of a scaly and unsmooth surface, and produce altogether very inferior castings. The remedy for this will be a remelting with a far greater addition of heat.

The alloys of gold should not be over-heated, and ought to be poured immediately after complete fusion has taken place; the latter may be easily ascertained by stirring with an iron rod, previously heated to just redness; the time of pouring, that is, when the fused mass is ready, is generally arrived at by the touch, it having more of a watery touch, and not at all cloggy, like it has when not properly fused. The ingot moulds should be rather slanting and not quite straight, the former being more convenient to pour into; and also it prevents spitting into the face of the operator when that irregularity takes place. Gold should certainly be stirred, and especially in Hall-marked qualities, in order to produce a perfect mixture, which would assay evenly. This information is given in answer to several questions we have received from correspondents wishing to be practically advised upon the subjects of these remarks.

Blue gold is very difficult to prepare at all times; it has, however, a very pleasing effect when used in conjunction with other shades of colored gold in the formation of artistic work, so that a few remarks upon its treatment may be of some service to that class of art-workers who are striving to promote "art and taste in design" as opposed to the "cheap and the vulgar." Blue gold is a mixture of iron and gold. The formula for 18 carat is as follows:—gold, fine, 15 dwts.; iron charcoal, 5 dwts.

This alloy is of a light blue color. The color is shown to advantage in the finish by well polishing the parts composed of it, and then pecking it up with the engraving or chasing tool. No coloring should be allowed to take place with this gold, but where it is unavoidable the color must be subsequently removed by the usual mechanical means, or the proper shade of color would not be given to this alloy of gold. This preparation of the mixture being the most important point with which we are now concerned, calls for a few detailed remarks upon it. It is best prepared in the mixture by dipping iron wire not too thick into the molten gold, which should be well covered

with charcoal flux—and this is one of the most important points of its preparation—to prevent oxidation. The iron used, of which charcoal is by far the best in producing homogeneous alloys with gold, should be quite clean and free from oxide before adding it to the gold. It may be cleaned by dipping for a very short time in weak sulphuric acid pickle and afterwards well rinsed and dried; or secondly, well emery-clotted until it has become perfectly bright. The right quantity of iron should then be added to the gold in the crucible at the proper moment, little by little, until the specified quality of lower alloy required has been reached. The alloy is then to be cast, hammered well down the narrow edges, annealed, again hammered, and again annealed, in order to make it tough. It is quite as well to hammer the bar upon the broad or flat surface, after the first few hammerings have taken place on the edges, to render it the more easily workable in subsequent stages. The ingot would may advantageously be heated somewhat hotter for this alloy of gold. Gold and iron easily combine in almost any proportion, providing the heat given to cause fusion has been great enough; gold facilitates the fusion of iron, hence it is that iron should always be made an addition to the fused gold in preparing its composition.

(To be continued.)

Watchmaking in Switzerland.

VICE-CONSUL DOERR, of Basle, in his report to the State Department on the industries of Switzerland, referring to the situation at the close of 1879, has this to say regarding watchmaking:

From Pruntrut, at the northwest corner of Switzerland, to the lower extremity of Lake Lemán in the extreme southwest, and from the frontier river Doubs down to the Jura Lakes and still farther, the watch manufacture once flourished as the most important branch of Swiss industry. The manufacture was carried on by able, well-to-do men, and wages were so high that a good workman could earn from 10 to 20 francs a day. Only first-rate work was produced. The orders from foreign countries, especially from England and America, came in direct. This continued to be the case up to the beginning of the seventh decade (1860-1870) of our century. Then it was that impure elements got mixed up in this branch of business; consequently a great part of this valuable branch of industry, or, to speak more correctly, of the trade in its productions became tainted, and watches of quite an inferior quality were brought into the market. In this way the greatest damage was done to the reputation of Swiss watchmaking; its star gradually sank, and, at the Philadelphia exhibition, the feeling seemed to be general that, in the face of the productions forthcoming by the competition of other countries, particularly of the United States and France, this branch of Swiss industry would be entirely destroyed. These apprehensions, however, were not realized. The better class of manufacturers met together, consulted, and sought by careful work and the use of all the improvements made by art and science to regain their former prestige, and, by summoning up all their strength, to compete successfully with other nations. These efforts were not made in vain. Orders came in again, workshops were enlivened, and better times would have dawned for the tried watchmaking population, if the general dullness of trade and want of employment had not pressed heavily upon and hindered every attempt at improvement. It is, however, to be expected that a removal and suppression, as far as possible, of inferior work, will be the happy result of this crisis.

The position which Swiss watchmaking took at the Paris exhibition has made up for much of the evil that had been done at Philadelphia, and Mr. Perret, the judge for awards in the watchmaking department, calls this exhibition a triumph, proving anew that, if the Swiss watchmakers would but keep up their confidence, courage and energy, nothing could hinder them from taking up and carrying to a successful issue the industrial and commercial contest, both in the present and in the future.

Diamond Cutting in Belgium.

THE following is an extract from the report of Consular Clerk Charles F. Thireon, to the State Department, on the industries of Belgium:

Diamond cutting has been known in India since a very remote period, but it never attained a great perfection there. In 1476, L. de Berchen, of Bruges, discovered the art of polishing this precious stone, an art unknown till then in Belgium. He established himself at Antwerp, and through his extensive relations with other jewelers he was enabled to improve his discovery, which made that trade very prosperous, and the fame of diamond cutters of Antwerp became great. They formed an important association, the members of which enjoyed a notable consideration. The first diamond cut at Antwerp was bought by Charles the Bold, Duke of Burgundy.

Kings and princes, who alone in that time could afford the luxury of wearing diamonds, protected the new industry; but the troubles which arose in Antwerp during the sixteenth century drove from the city the best workmen, who established themselves in Amsterdam, and there continued their trade, which developed itself considerably. The reputation of the Antwerp diamond cutters was, however, maintained, and in the seventeenth century this industry was still prosperous. A popular saying of that epoch was, that laces, diamonds and silk made Antwerp rich. In 1600 the Emperor of Austria, who visited the workshop of one of the principal diamond cutters, raised this industry to the rank of art.

In the mean time Amsterdam, which was, through the development of its commerce, in more direct communication with the countries of production, diverted a great part of the Antwerp diamond trade, which greatly languished under the Austrian rule. It was still more depressed under the French domination, and it was only in 1824 that large orders from foreign countries produced a revival.

The first steam diamond-cutting machine came into use in 1840. Since that epoch the diamond trade has undergone many vicissitudes, but it is still flourishing and of great importance in Antwerp. About 800 workmen are employed there in cutting and polishing the rough stones, of which the largest quantity is imported from the Cape.

The amount of capital invested in that industry is about \$4,000,000; the salaries paid to workmen alone amount to about \$1,200,000 annually.

Why the Needle Points North.

THE reason why the needle points in the northerly direction is that the earth in itself is a magnet, attracting the magnetic needle as ordinary magnets do, and the earth is a magnet as the result of certain cosmical facts, much affected by the action of the sun. The laws have periodicities, all of which have not as yet been determined. The inherent and ultimate reason of the existence of any fact in nature, as gravity, light, heat, &c., is not known further than that it is in harmony with all the other facts in nature. Even an earthquake is in perfect harmony with, and the direct resultant of, the action of forces existing under general laws. A condensed explanation in regard to the needle pointing to the northward and southward is as follows:—The magnetic poles of the earth do not coincide with the geographical poles. The axis of rotation makes an angle of about 23 degrees with a line joint to the former. The northern magnetic pole is at present near the Arctic circle on the meridian of Obmah. Hence the needle does not everywhere point to the astronomical north, and is constantly variable within certain limits. At San Francisco it points about 17 degrees to the east of north, and at Calais, Maine, as much to the west. At the northern magnetic pole a balanced needle points with its north end downward in a plumb line; at San Francisco it dips about 63 deg., and at the southern magnetic pole to the south and points directly down. The action of the earth upon a magnetic needle at its surface is of about the same force as that of a bar of steel magnet, forty inches long, strongly magnified, at a distance of one foot. The foregoing is the accepted explanation of the fact the needle points to the northward and southward. Of course no ultimate reason can be given for this natural effect any more than for any other observed fact in nature.

Business Notes.

F. Gird has removed from 32 to No. 9 John street.

Howard & Sherriebe have removed from 14 to 10 Maiden Lane.

George W. Shiebler has removed from No. 6 to No. 8 Liberty Place.

H. H. Heinrich has removed from No. 41 Maiden Lane to No. 12 John street.

The business of the late George W. Platt has removed to No. 6 Liberty Place.

The Meriden Britannia Company is offering a large line of attractive novelties.

Dorrance, Edge & Co., manufacturing jewelers, will remove May 1st to 15 John street.

Max Freund, of Messrs. Max Freund & Co., will sail for Europe in the Arizona, May 10th.

D. W. Granbery, of Hall, Nicoll & Granbery, sailed for Europe in the Germania April 30th.

David Untermeyer, of the firm of Keller & Untermeyer, sailed for Europe April 30 in the Donau.

Nestor Marx, of the firm of Van Moppes & Marx, will sail for Europe May 12 in the steamship Arizona.

E. G. Buckenham, successor to Buckenham, Cole & Hall, diamond merchant, has removed to 41 Maiden Lane.

E. H. Sussmlich, of Sussmlich, Bros, Dixon, Ill., has retired from that firm. Wm. A. Sussmlich will continue the business.

Mr. Flurscheim, of Ferdinand Bing & Co., has gone to Europe in search of bronzes, bric-a-brac, etc. for the fall trade.

Brown Bros., the well known manufacturers of forks and spoons, have removed from No. 81 to No. 82 Chambers street.

The son of Mr. Pierson, agent of E. Howard & Co., has gone to San Francisco and entered the employment of Levison Brothers.

Kossuth Marx & Co. are introducing some new styles of silk fob watch guards, ornamented with gold, diamonds and other precious stones.

J. B. & S. M. Knowles have removed from No. 8 Liberty Place to the store formerly occupied by the late George W. Platt, No. 20 Maiden Lane.

F. Stevens, of Atlanta, Ga., is now finishing watches in his own factory. They are finished under his own supervision and sold with his personal guarantees.

Rosekrans & Weber, of Chicago, jobbers in jewelers' supplies, offer an attractive line of well selected goods, suitable to the requirements of all classes of dealers.

Van Moppes & Marx, diamond importers, have fitted up a neat and attractive office at No. 9 Maiden Lane, and are now comfortably settled in their new business home.

The Pairpoint Manufacturing Company will occupy a portion of the store No. 20 Maiden Lane as a showroom for their plated ware. The store is now being neatly fitted up for their reception.

L. M. Lebreton, importer of watches and diamonds, has removed from No. 3 to No. 10 John street. Mr. Lebreton has recently been recognized by the various companies as a jobber in watches.

The Derby Silver Company, of Derby, Conn., under the management of W. J. Miller, secretary, is devoting its entire energies to the legitimate trade, and is producing some fine and artistic goods.

Fitch & Harriman are now comfortably settled in their new business home, in the Meriden Britannia Company's building, Union Square. Their new quarters are fitted up in a very attractive manner.

The manufacturers of the American Lever Sleeve Button will furnish gratis through the jobbing trade, electrotype cuts of their buttons to retail dealers who may wish to advertise the button locally.

Hall, Nicoll & Granbery are manufacturing an attractive line of lamps and candlesticks in polished brass, brass and Longwy falence, a few designs of which may be seen in their advertisement elsewhere.

John A. Riley & Co., manufacturing jewelers, recently introduced a new patent bracelet which is a great success. It is a favorite in the trade, and can be found in all the principal jewelry stores of the country.

Kendrick, Davis & Co., Lebanon, N. H., manufacturers of the celebrated Dust Proof Watch Keys, have recently issued a very neat and useful catalogue and price list of all the styles of keys manufactured by them.

E. Lilienthal, of New Orleans, is said to carry one of the finest and cleanest stocks of jewelry to be found at any establishment in the south. His store is a model of neatness, and the attendants are courteous and obliging.

The American Watch Tool Company of Waltham, has recently issued an illustrated catalogue of lathes, machinery, tools, etc. of their manufacture, which will be found exceedingly useful to prospective purchasers of such goods.

The Celluloid Show Case Company is now prepared to execute orders for show cases made of this compound. A very fair example of this class of goods can be seen in the show window of Dougherty & Pedersen, No. 23 Maiden Lane.

Gustav Marcus has been admitted to a partnership in the firm of Levison Brothers (the California Jewelry Co.) of San Francisco. Mr. Marcus has been seven years in the employ of the firm, and this is a deserved recognition of valuable services rendered.

The Morse Diamond Cutting Company has introduced the new lithia emerald, which has excited so much attention in this country and Europe. This emerald is a production of North Carolina, and was fully described in the April number of THE CIRCULAR.

Joseph F. Chatter is introducing an elegant and attractive line of silver jewelry, pins, earrings, scarf pins, combs, etc., in new and tasteful designs. The new tortoise ornamentation introduced by this firm is one of the most successful styles of finish introduced this season.

Henry J. King, for many years a well known traveler on the road, has started upon the manufacture of jewelry in Hoboken, under the firm name of Henry J. King & Co. This firm will make a specialty of rings, and we wish them all possible success in their new venture.

The Burbank Manufacturing Company, in consequence of their largely increased business, have been obliged to greatly enlarge their salesroom and offices. They have just taken possession of the offices adjoining their old ones, and are fitting them up in an elegant manner.

L. & A. Mathey, agents for the H. L. Matthe watch, has been notified that Mr. Matthe has received the first, second and fourth prizes from the Neuchâtel Observatory for observatory test of watches. A record of these tests will be found in their advertisement in this issue of THE CIRCULAR.

The Meriden Britannia Company has recently fitted up a reception room for the convenience of their patrons, who are cordially invited to make use of it for business purposes. It is provided with writing tables, stationery, mail facilities, and every convenience for the transaction of business.

H. C. Haskell, 12 John street, introduces a line of artistic jewelry, embracing novel designs in rings and scarf pins. In rings he presents a great variety in sard, onyx, intaglio or encrusted initials. A new device adopted by this house succeeds perfectly in keeping the stones in rings in their places.

George C. White, of Rogers & Bro., and Mr. Heecham, the courteous bookkeeper for the same house, have just returned from a flying visit to Florida, where they went for relaxation after their severe labors during the winter. They return much invigorated by the balmy air of the land of oranges.

Morgan & Headly, manufacturers of gold and silver specialties, in consequence of a largely increased business, have been obliged to extend their facilities for manufacture. They have just completed a wing to their factory in Philadelphia, and will soon have facilities for giving employment to 250 workmen.

C. G. Alford & Co. have removed to larger and more commodious quarters at No. 20 Broadway. Their new offices have been handsomely fitted up with everything requisite for the better display of goods and greater convenience of buyers, and are in keeping with the enterprise and good taste displayed by them.

David F. Conover, of the well known firm of D. F. Conover & Co., of Philadelphia, with his family, is sojourning temporarily in Florida. Mr. Conover has been greatly overworked of late, and has gone south by the advice of his physician. A few weeks' relaxation and absolute withdrawal from business cares, will, unquestionably, restore our good friend to his pristine vigor.

Carrow, Bishop & Co. have just introduced to the trade a new device for measuring bracelets. It is similar in character to the ring gauge, but has the additional advantage of being flexible. It is in fact, a conical form made of stiff paper, on which the gauge, in inches and half inches, is printed. The size of the bracelet is thus indicated at the point where it binds upon the cone. This is a very simple and useful device, and will save dealers much trouble and annoyance. It will be sent gratuitously to any dealer applying for it.

Leopold Well & Co., who had the misfortune to have their trunk stolen from one of their travelers in Washington, some months ago, have succeeded in recovering all the goods stolen. The police authorities having failed to discover the thieves, Mr. Well took the case into his own hands, and, after some indirect negotiation with them, obtained his goods again. It cost him about \$500 to recover them, but this is probably less than it would have cost had he recovered them through the instrumentality of the police.

Maiden Lane and the adjacent streets occupied by the trade, seldom presented a busier appearance than during the past few days. In addition to the business being done, many are making preparations to move, or to increase their business facilities. Alterations in offices are being made on every hand, and the number of new safes being hoisted up to second and third and fourth story floors is something remarkable. There has evidently been a run on the safe manufacturers, and their business, at least, must have been prosperous this spring.

The question of a uniform standard of time in this country for both popular and scientific use having, says Science, been examined by the American Meteorological Society, Professor Barnard, its president, has recommended the adoption of five sectional standards for the American continent. The standard meridians those of 60, 75, 90, 105 and 120 degrees west of Greenwich. The time of the first would be known as "Eastern time," and would be the standard in Newfoundland, Nova Scotia and New Brunswick. The next would be "Atlantic time," current from Maine to Florida. The third would be "Valley time," for the center of the continent; "Mountain time" for the Rocky Mountain region; and finally "Pacific time," for the Pacific States and British Columbia. Each of these standards would be exactly one hour later than the one east of it; and the first would be just three hours later than Greenwich time. The time of the center of the continent, which passes through the Mississippi Valley, and might be regarded as the standard time of the United States, would be just six hours later than Greenwich time.

Trade Gossip.

Bergen's jewelry store at Bound Brook, N. J., was nearly destroyed by fire. Insurance not stated.

The annual meeting of the Jewelers' Guild will be held May 24th at Rock Island. A large attendance of the trade is expected.

The retail dealers in Canada are taking steps to organize a protective jewelers' association similar to those existing in many of our western states.

B. Hall, of the firm of Hall, Nicoli & Granbery, fell from his horse recently and broke his arm, which incapacitates him for business for some time.

The jewelry establishment of C. P. Eldred at Honesdale, Pa., was robbed recently of ten valuable gold watches, a number of silver watches, and a large amount of jewelry, in all valued at \$2,000.

Col. Thomas A. Scott lately bought a fat in Northumberland County, Pennsylvania, a clock made by his uncle in 1790. It still keeps good time, and every three hours plays a tune on the bells.

Henry Smith, an old jeweler, well known in this city, recently died in St. Paul, Minn. He conducted a little manufacturing jewelry business in that city, where he had been located for many years.

Francis S. Kennedy, with Aiken, Lambert & Co., was married April 19 to Miss Clara C. Totten, a very beautiful and most estimable young lady of this city. May their future troubles be little ones.

A Cincinnati jeweler was recently relieved of a water snake, which it is believed he swallowed while drinking from a brook several years ago. His friends always said there was more in him than people thought.

A fire recently occurred in the top floor or workshop, of John R. Greason & Co., No. 2 John street. Slight damage was done to the machinery, but this has all been put it order again, and the shop is once more in full operation.

Queen Isabella, of Spain, is purchasing Brooklyn property. It cannot be that she intends to establish a jewelry store for the sale of the remnants of her jewels, with any expectation of receiving protection from Brooklyn's imaginary police force.

A bold, burghlarious youth recently entered the jewelry store of Mr. Drake, at Elmhurst, grabbed diamonds valued at \$4,700 and ran out. He was pursued and captured, and all the diamonds were recovered except one, valued at \$300, which the thief threw away.

The business men of Galveston, Texas, recently held a meeting for the purpose of taking measures to force the repeal of the iniquitous law in force there levying a tax on commercial travelers. A similar law in Louisiana and Maryland has been declared unconstitutional.

E. A. Bourquin, formerly a well known watch importer of this city, died at Colorado Springs, April 8, of consumption. His body was brought to this city for interment. But he was not a former acquaintance in the trade, and was highly respected by all who knew him.

August Saltzman and Jules Griet are set sail for Europe May 4, in the *Amrique*. It is singular that Miss Sarah Bernhardt should have selected this vessel in which to return to her own country. It is to be hoped the young men will be proof against the charms of the noted actress.

An attempt was made a few nights since to force open the jewelry safe of Colton & Co., manufacturing jewelers, at No. 59 Walnut street, Newark. The burglars drilled holes in the heavy iron door, poured in powder and then applied a lighted fuse. The door being hollow, there was not enough of the powder remaining in the lock to do any damage.

Alexander Rodanow, the individual who it is alleged represented the Rodanow Watch Company of Boston, and who was arrested for using the United States mails for fraudulent purposes, was convicted on that charge, but has been granted a new trial. The same individual figured, under the name of Dr. Nathan Ganz, as a communist and editor of a socialist paper in Boston.

A stranger from Brenham, Texas, who is helping Galveston out in the Mardi Gras business, took his watch to a watchmaker to have it repaired. After a few minutes' work the watchmaker handed it back with the remark that the damages were \$2. "What was the matter with it?" asked the stranger. "There was a hair in it." "Was that all?" You ought to have found a hair mattress in it for \$2.

The Court of Appeals has decided that a watch is not an article of personal adornment. It is not carried or used as a jewel or ornament, but as a timepiece or chronometer, an article of ordinary wear by most travelers of every class, and of daily use by all. It is as useful and necessary to the guest in his room as out of it, in the night as in the day time. It is carried for use and convenience, and not for ornament.

The cutting in the prices of gold cases that has been going on of late has been very demoralizing to the trade. It was commenced by a certain manufacturer surreptitiously giving special discounts to his customers. Other manufacturers were determined to put an end to it, and cut under them. The cutting has been carried to a suicidal extent, and unless soon brought to an end, some of the manufacturers will wish they had never learned the business.

Charles Duffy, traveler for Enos Richardson & Co., well known jewelers of this city, had his sample trunk robbed recently in Baltimore. While at supper, some thieves entered his room and made off with about \$8,000 worth of goods. No clue to the robbers has been found by the vigilant police of that city. The Jewelers' Protective Union has taken charge of the case, and Pinkerton's detectives are now on the scent of the thieves, and the indications are that they will be run down by the time this paragraph reaches our readers.

A mechanic of Rochester, N. Y., has, according to his own statements, just completed a duplicate of the celebrated astronomical clock of Strasburg, in which city he was born and lived for many years. The only difference between the workings of the two clocks is in their size and in the form of the astronomical portions. The case for the main part of the Rochester clock is ten and one-half feet high, while it is in all parts exactly proportionate to the clock seventy-five feet high which it imitates.

April first, two men entered the jewelry store of Joseph K. Davidson, at No. 929 Chestnut street, Philadelphia, and one of them asked to have a diamond ring, which he had bought several days before, exchanged. The clerk's attention was attracted by the other, and after the departure of the men it was discovered that they had taken a box containing diamonds, sapphires and other precious stones, valued at nearly \$4,000, and left in its place a duplicate box containing white and colored papers, such as are used by jewelers to wrap diamonds in.

In the case of Aldrich, of Chicago, who was convicted of receiving the goods stolen from Mr. Morrow, traveler for Ernest Thoma, the court has granted a new trial. Aldrich was a local politician, and influence of a peculiar nature is being brought to bear to keep him out of State Prison. It is reported that a noted gambler and a suspected thief, offers to bet that Aldrich will not be sent to Joliet. The Jewelers' Protective Union has secured special counsel to prosecute the case against Aldrich and his companions, and if there is justice to be had in Chicago, these confessed thieves will get the benefit of it.

Henry Rowland, of Albany, is offering 25 cents on the dollar in compromise of his indebtedness. This offer will, doubtless, be accepted, as the case of Mr. Rowland meets with the sympathy of the trade. Mr. Rowland's failure is attributed mainly to the fact that he kept up too fine an establishment, and carried a stock of too fine goods to be appreciated by the citizens of Albany. He sought to educate them to an appreciation of art work in jewelry, but they did not respond. His failure was the inevitable result of attempting to sell 18 karat goods in a 10 karat town. Mr. Rowland was further handicapped by his honest efforts to satisfy some old claims that were hanging over him, most of which he succeeded in paying off.

The Iowa Retail Jewelers' Protective Association met at Ottumwa March 16. There was a goodly attendance of members, and several new ones were enrolled. The old officers were re-elected, and authorized to appoint delegates to the Illinois convention, to be held at Rock Island May 11. Several letters were received from absent members, complimenting the Association on its good work. The question of revising the black list was referred to the executive committee, with the request that the members be notified at once of any action taken. The thanks of the Association were voted W. N. Boynton for his interest and zeal in furthering the welfare of retail dealers. Des Moines was chosen as the place for holding the next convention.

The jewelry most in vogue at present is copied from Oriental and semi barbaric models, Moorish and Egyptian designs being held in special favor. Crescents, exquisitely shaped arabesques, and gold and silver antique medallions depending from jeweled bangles of Roman gold, Egyptian heads, the Sphinx, miniature obelisks, swinging columns and other fantastic designs, are worn constantly, are all exceedingly fashionable. Brooches are, some of them, very large and of flower designs, studded with fine gems. The setting of solitaire diamonds is exceedingly broad and rich, and emeralds, sapphires and cats eyes are associated with them. String pearls are now worn by brides. They are ornamented with hand painted decorations and finished with pearl pendants.

The jewelry store of W. Wise, No. 239 Fulton street, Brooklyn, was recently entered by burglars, who forced an entrance from the rear, and carried off 130 watches left for repairs. This burglary is more extraordinary than the one that took place Sunday morning, in the latter daylight, when the policemen were supposed to be in the immediate neighborhood. The thieves took time by the forelock and the Brooklyn police by surprise. Mr. Wise, however, recovered his goods by treating directly with the thieves—through a convenient intermediary. He was required to pay \$2,000, and the goods were returned through an express company. Five policemen in the block in which was watched the block in which Mr. Wise's store is situated, were summarily dismissed from the force for permitting the burglary to occur.

Recently a watchman employed to watch the premises of certain jewelers in Maiden Lane at night, was found lying drunk on the floor of one of the stores early in the morning. He had been on duty all night, and the night, and the store doors were wide open. Of course, he was promptly dismissed. Since then an effort has been made to secure the services of a competent man to take his place, and the name of a policeman, thoroughly familiar with the beat and in whom the utmost confidence is reposed, was suggested. A watchman to guard the stores of jewelers in the block lying between Nassau and Nassau street was devised, and it was proposed that the policeman referred to should have charge. But when the merchants were approached on the subject, it was found impossible for them to agree, as almost every store owner in the block wanted to have his own watchman. As a consequence, the well matured plan of the originators of the idea has fallen through, much to their disgust. In the block referred to, there is probably contained more wealth than in any other one block in New York, yet it receives only one police vigilance as the other blocks receive five. This is a short-sighted policy on the part of the merchants who leave their property unprotected to depredations, and it is trifling with their own interests to permit their preferences as to an individual to defeat a plan that would contribute so much to the safety of their property. The jewelers must have special watchmen to guard their premises, and the police have the confidence of all. It is certainly the best man for the place. A big robbery in the Lane some night may serve to convince them that economy in this respect is saving at the pigstot and wasting at the bung.

THE Jewelers' Circular and Horological Review.

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THE JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

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Jewelers' League.*

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AGENTS:

PRATT & Co., 9th & Arch Streets, Philadelphia, Pa.
CHANDLER & SHADER, 57 Washington Street, Chicago, Ill.

Trade Prospects.

OWING to the pertinacity with which "winter lingered in the lap of spring," the severity of the weather, the impassable condition of the roads, the floods in many parts of the country, the spring trade was disappointing to most manufacturers and jobbers. Probably none of them put any faith in the predictions of Prof. Vennor, who prophesied a severe winter and a late spring—or if they did, they did not anticipate the disastrous consequences of such a prolonged cold season—and they consequently prepared for a brisk spring trade. As a matter of fact, the demand for goods thus far has been far less than was expected, and the manufacturers and jobbers find themselves with large stocks on hand. The season has now passed, and there is no reason to anticipate any rush of business during the summer months. The farmers have had a hard struggle with the vagrant weather and its consequences, and are now busy repairing damages, putting in their crops, and attending to the duties that should have been completed a month ago. Traffic in the rural cities and villages is dependent almost entirely upon the farmers, and at those seasons when they are kept at home, trade is generally stagnant. It is when the crops are moving and farmers coming to town frequently that the country places put on a busy appearance, and goods are sold with great activity. There is good reason, therefore, for the lightness of the spring trade, and for anticipating continued dullness for another month. Retail dealers are not likely now to stock up till fall, but will content themselves with ordering small quantities of goods according to their necessities. This will be the wisest course for them to pursue, working off their old stock as opportunity presents, and preparing for a new stock of fresh goods for the fall trade. This will entail some hardship on the manufacturers and jobbers, who will have to carry heavy stocks through the summer, but when the demand does come, it will probably be active and extensive. While the frosts and the floods have delayed the

work of the farmers, it is claimed that the conditions have been of a character to insure a bountiful harvest this fall. The latter part of last fall and the early winter were characterized by excessive drought, which robbed the earth of its moisture to such an extent that the heavy snow fall and the floods were necessary to insure the raising of crops this year. It is predicted, consequently, that there will be no falling off in the harvest this season, and that prices for produce of all kinds will rule higher than last year. If this be so, it will be good for trade of all kinds. There is, therefore, apparently no cause for discouragement, but, on the contrary, every reason to anticipate a large volume of business this fall. It is to be hoped that manufacturers will be careful not to overstock the market with goods, but to limit their production during the summer to supplying what seems absolutely necessary. Nothing is so injurious to the business as an overstocked market, especially when retail dealers are overloaded with goods which they are unable to dispose of. Keep down the supply and thereby stimulate the demand. A man always wants more what he can't get, and when dealers find the market short of goods, they invariably want more than usual, and will pay better prices.

Compromising Felonies.

WE have been called upon of late to record numerous robberies of jewelers in various parts of the country, and, in almost every instance, have been forced to add the statement that "the police have no clue to the robbers." These robberies have been committed in a variety of ways—some by burglars, others by sneak thieves, and still others by those bold operators who fasten the door of a dealer's place so that he can't get out, and then smash in his show window and make off with the articles on exhibition. In nine cases out of ten the thieves escape, and the police are powerless to discover them or to recover the stolen property. Then the plundered victim is left to his own resources, and search of the numerous pawn shops generally results in the recovery of a portion of the goods, for which the owner has to pay. So inefficient have the police in various cities shown themselves of late, that it is becoming a matter of wonder what they are paid for. In New York and Brooklyn they make a good show, in their fine uniforms, but so far from affording protection to life or property, they might almost as well be in Kamshatka. In the last issue of THE CIRCULAR we gave the particulars of several robberies that had occurred in the trade, the most notable of which was that of Mr. Wise, of Brooklyn. His store is located on the most frequented street in the city, has a large plate glass front, and is brilliantly lighted at night; half a dozen policemen are required to pass the store every night, and are supposed to try the doors of all stores, and to look in to see if anything has been disturbed. Yet burglars entered this store, spent several hours inside, wrenched a safe from the wall near the front door, broke it open and secured 130 watches belonging to customers, tried to blow open another safe, and in other ways conducted themselves like enterprising burglars, who had no fear of the police. They finally departed with a lot of valuable goods, and, as usual, "left no clue" by which the police could trace them. After a few days the thieves sent word to Mr. Wise that they would return his property for the sum of \$2,000. Having no confidence in police detectives, and being

anxious to recover the watches belonging to his customers, Mr. Wise paid the money, and the goods were returned by express. We cite this case simply as a sample of several others that have recently occurred. The boldness of modern thieves and the inefficiency of the police seem to leave no other course open to a person who has been robbed than to open communication with the thieves and secure the return of his goods on the best terms possible. Of course, if the robbers secured any money from their victim, that is confiscated beyond redemption, and any negotiations they may enter into look only to the return of other valuables than legal tender. Thus the lack of capacity on the part of the duly appointed guardians of the peace forces respectable business men to become law breakers, and to compromise felonies that should send their perpetrators to State prison. But what else can our merchants do? They cannot afford to lose their goods entirely, and if the police cannot recover them and catch the thieves at the same time, the merchant must do the best he can for himself. It is all very well for the press, with virtuous indignation, to denounce Mr. Wise for paying money for the return of property stolen from him, but what could he do? He was threatened that unless he complied with the demand, the thieves would melt up the watches in twenty-four hours. There were 130 watches belonging to as many different customers, and each owner was clamoring for the return of his property. Some of the watches were prized far above their intrinsic value because of certain associations connected with them, and Mr. Wise felt it to be his duty to his customers to secure their watches at any personal sacrifice to himself. Had the property been all his own, he might have hesitated, but as it was, he had no recourse but to comply with the demands of the thieves. Another member of the trade who was robbed some time since, recently recovered his goods by dealing directly with the thieves. Detectives had been working in vain to secure them, and finally the thieves appealed directly to the owner for a "compromise." They were ready to settle for about 20 cents on the dollar, the goods being of a character that would have yielded but little more than this if consigned to the melting pot. In the case of a more recent robbery, where the goods would assay about 75 cents on the dollar, the thieves have too good a thing to compromise for any very small sum. They may not be able to sell them in the market, as they could be readily identified, but the melting pot destroys all traces of identity, and the product of the melting process is substantial gold, that always has a market. While it is unquestionably against public morals to compromise with thieves, and is calculated to make them bolder in their operations, considering the inefficiency of our police, we do not believe public sentiment will seriously condemn the man who, having exhausted all other means, finally buys back his own property from the thieves who had stolen it.

But the worst feature of modern thievery is the immunity that rogues enjoy even after they are captured. These bold miscreants are so in league with politicians and men in authority that it is almost impossible to convict them even when, by accident, they are captured. As a case in point: the men identified with the trunk robbery in Chicago a few months since, included in their number one city official, an ex-detective, a lager beer saloon keeper, who is also a politician, and a well known pawn broker. The officer holder has, through the instrumentality of the Jewelers' Protective Union, been convicted by the jury that tried him, but, owing to the peculiar influence he controls, he is not only not in prison but has been granted a new trial. This, too, in the face of the fact that one of his confederates turned state's evidence and exposed the whole gang. Gamblers and politicians of Chicago are offering to bet that not one of the implicated persons will ever reach State prison. Things have come to a pretty pass if burglars and sneak thieves are to control our courts and public officers to such an extent that the punishment of well known rascals is defeated. The Jewelers' Protective Union has done good service already in pushing the prosecution of thieves, and in its efforts to do so has found no other obstacle in its way so great as the influence brought to bear upon public officers, courts

and jurors by the criminal classes. This would indicate that the politicians are under such obligations to the professional law breakers that they dare not refuse them their influence to save them from punishment. It was a similar corrupt condition of things that led to the organization of the vigilance committee in San Francisco some years ago, and the abrupt departure, under its direction, of the thieves and desperadoes from that city. That committee, by its vigorous action, purified the atmosphere of San Francisco, and the criminal classes gave it a wide berth for many years. We would not recommend the adoption of lynch law, by any means, still if a few lamp-posts were converted into gibbets, the sight would be most edifying.

In the present condition of police inefficiency and corrupt influences that dominate public officials, there seems to be no recourse for the victims of burglars and thieves but to compromise with them on the best terms possible. To this end, would it not be well for this class of persons to establish a "Burglars' Exchange," where a person who has been robbed can go direct with positive assurance that he can negotiate in person with the thieves who have robbed him? By this means the annoyance, delay and expense of calling in the police would be avoided, and there would be no middle men to make a double profit by conducting the negotiations, receiving one fee from the victims and a percentage from the thieves. In the absence of such an "Exchange," we suggest that hereafter when a robbery is committed, the robbers leave a card behind stating for what sum they will return the goods and where a package of greenbacks would reach them. As the police have dispensed with their vigilance, and now give taxpayers little or no protection, we do not see the necessity of employing them as go-betweens to recover stolen property.

Deficiencies in Hotel Protection.

THE jewelry trade, has at certain seasons of the year, many thousands of dollars in values scattered throughout the country, in the hands of their traveling salesmen, and are subjected to much apprehension on their account. The perils of traveling are numerous, and these enterprising salesmen have to be exceedingly vigilant to prevent the goods entrusted to them from being stolen. Not the least of the perils to which their goods are exposed are encountered in hotels. There is scarcely a hotel in the country that affords adequate protection to the goods which these salesmen carry. Safes are generally provided in which guests are requested to deposit valuables, but their capacity is not equal to a trunk full of jewelry. Besides, these safes are ordinarily altogether too public and accessible to afford that degree of security that is desirable. As to the sleeping rooms of hotels, they can usually be made safe when the traveler is inside, but during his necessary absences, the door can only be fastened by an ordinary lock that can be readily unlocked with a skeleton key, and for which there are usually half a dozen duplicate keys about the house. The traveler is obliged to be absent from his room, visiting his customers, taking his meals, and for various other purposes, and during these absences, his main stock is left unguarded in his room save only by a single cheap lock on the door. Hotel proprietors are unwilling to assume responsibility for goods so left, and even object to putting them in their safes if they are expected to be accountable for them. There have been numerous robberies in hotels of jewelry salesmen, and it is time hotel proprietors adopted some means to give protection to the valuable goods travelers carry with them. It would not cost much for them to provide a vault in which trunks could be kept, and which should be inaccessible to everyone but to some responsible person in charge of the house. So disposed of, the traveler would feel that his trunk, securely locked, was in good keeping. With such vaults hotel proprietors would feel safe in assuming responsibility for goods deposited therein, and might use that fact to splendid advantage as an advertisement for their houses. Travelers with valuable goods would be glad to patronize such hotels in preference to any others. But at present, travelers' trunks, containing thousands of dollars worth of tempting goods, re-

ceive no more protection in the average hotel of the country than does a barrel of potatoes or a bag of beans. They are tossed about with other baggage, handled by irresponsible porters, frequently chucked into a baggage room promiscuously with all sorts of luggage, which baggage room is usually the resort of all the loafers that ordinarily hang about a hotel. The hotel keeper who will inaugurate a plan for giving proper protection to the trunks of traveling salesmen, thereby relieving them of the necessity of being on guard incessantly, will confer a great boon upon all commercial travelers, and will reap his reward by receiving all their patronage.

The "Drummer" Tax Law.

SEVERAL states in the Union have enacted what is termed the "drummer" tax law, that is, a statute that imposes a tax upon all traveling salesmen selling goods within their borders. This has always been felt to be a great hardship by merchants, as it amounted to double taxation; the salesmen paying the "drummer" tax, and the dealer who purchased from him paying another tax on the same goods. Texas has recently been indulging in some grand and lofty tumbling in reference to this peculiar form of taxation that has seldom been equalled. Under the law as it existed in Texas for a long time past, commercial and other establishments which sent agents through the state were obliged to pay an annual tax of two hundred dollars. For this sum they were permitted to have as many traveling representatives as they desired. Some of the larger houses in Galveston and the other principal cities, taking advantage of this provision, have frequently had from ten to twenty-five travelers going through the state at one time. Under the new law this privilege will be cut off. The new statute provides, in the most direct and explicit manner, that each traveling salesman or other agent of any mercantile or business firm who shall solicit orders or procure business shall be taxed fifty dollars a year. This tax is to be levied without any regard to the frequency or extent of the wandering salesman's trips; and, warned by past experience, the law-makers have been particularly careful to render violations or evasions of the enactment very difficult and punishable by severe penalties.

It is stated that upwards of 2,000 traveling salesmen are employed in Texas at various seasons of the year, so that, if the number is maintained the state will derive an annual income of about \$100,000. But this is not the worst of it. The \$2,000 heretofore paid will not be applied to obtaining new licenses—on the contrary, that is confiscated, and the new law goes into immediate effect, whereby travelers are required to pay \$50 additional for a license. Texas firms that have paid the tax, however, are to be credited with such portion that has not been earned by the state, on account of a tax of \$180 that every local merchant is required to pay. Mercantile and other houses outside of Texas which have recently paid the two-hundred-dollar tax for the privilege of employing traveling agents in the state will have no such redress. It is held that they paid this sum solely for the drummers' privilege, and that as the new law supercedes the old one, they must now, even though their tax of two hundred dollars has just been paid, again come forward and pay an additional fifty dollars a year for every salesman they send into the state. This may be good law in Texas, but it certainly cannot be claimed that such a decision on the part of the authorities is sanctioned by common equity or any known rule of fair play and honorable dealing. From the tax-books it appears that more than three hundred Northern, Western and other merchants outside of Texas will be the sufferers by the new law. Of course, they will have no redress. The action of the legislature must doubtless be taken as final. It is but justice to the Democratic Controller to say that he pointed out to the General Assembly the wrong which would be done by the new law and the discredit which through it would indirectly fall upon the state. The law-makers entirely disregarded his advice and suggestions, however, and, intent only on reducing the ad val-

orem tax on real property to the extent of 20 per cent., rushed the new law through.

In one or two states this "drummer" tax has been held to be unconstitutional, and there is little doubt but the courts in every state where similar laws exist will hold the same view whenever a case is presented to them. Unequal taxation, in any form, is unconstitutional, and the "drummer" tax imposes a special burden upon one class of merchants that is escaped by others. But, independent of the legal phases presented by such statutes, the policy of enacting them is unwise, impolitic and shortsighted. It is simply an indirect way of exacting additional taxes from the citizens of the state, the "drumming" being simply the medium for collecting them. Merchants generally are not such philanthropists that they are going to throw their money into the treasuries of various states without getting some return for it. When the state of Texas demands \$50 from a traveling salesman, he simply puts up the price of his goods, and, in retaliation for what he considers an outrage, the chances are that the advance he makes will pay the tax two or three times over. These commercial travelers sell to retail dealers, and these exact a profit from the consumer, so that the effect of all such discriminating taxation is to compel consumers to pay the tax. But it is a great annoyance to all persons subjected to such taxation, which they would be glad to be rid of. But for this tax, Texas dealers would be supplied by traveling salesmen with goods just as cheap as they could buy them in the northeastern factories, and would have the additional advantage of examining many varieties of styles and designs before purchasing. This "drummer" tax is an embargo laid upon commerce, and should be repealed in every state where it exists. We suggest that the jewelry trade combine to make test cases, and carry them to the highest court in every state where the imposition is attempted.

Uniform Time.

IN these days of electricity and railroads, it is important to every one to have correct time. A difference of half a second may cause a man to miss a train, to be late for an important engagement, or to so mislead him as to disarrange his business affairs. It has been the ambition of horologists to produce watches and clocks that should mark time accurately, and while this has been accomplished with wonderful success, that fact avails little so long as there is no accepted standard of time. Men boast of their elegant watches and are proud of their qualities as time-keepers; owners of watches will wager upon their absolute correctness and accuracy; yet it is almost impossible to find two watches that agree exactly upon the time at any hour in the day. This is not because of imperfections in the mechanism of their watches, but because they are set to different standards of time. The same is true of the clocks in the counting rooms of our business men, in factories and great industrial establishments. Many times, much depends upon the accuracy of these timekeepers, for, in the rush and bustle of the active lives led by our business men—all of whom seek to accomplish in a few hours what should take as many days—the loss of a few moments may result in the loss of many dollars. That there is so much variation between clocks and watches is not so much attributable to imperfect movements as to a lack of uniformity in the standards by which they are regulated. In this great city of New York, to whose residents minutes are more valuable than to almost any one else, owing to the fact that so many thousands of them are dependent upon steamboat and railroad connections when going to and from their places of business, there is absolutely no standard time. It is true that the time ball on the Western Union Building is supposed to give the exact time at noon as marked at the Washington Observatory—the ball being dropped by electricity at the exact instant of noon at Washington—but this is not generally accepted as standard time. Some railroad trains run on Philadelphia time, and those that use New York time do not agree by several minutes. It

would be a great convenience and blessing to our citizens if they could have uniform time, and the means for obtaining it are so simple that we wonder arrangements have not been completed before this for supplying it to them. A system could be readily devised by means of which the time could be accurately and uniformly marked on the dials of every clock in every place of business and residence in the city, and at comparatively small cost. Electricity was long ago used in the science of horology, and there is no reason why it should not be applied to give us a uniform standard of time. In Paris this has been successfully accomplished, and not only are the clocks of citizens run by a uniform electric system, but dials are erected in the public thoroughfares, which indicate to passers by the time of day. In another part of this issue of THE CIRCULAR we give a full description of the system in use there, together with illustrations exhibiting the apparatus employed. This seems very simple, not expensive, and readily adaptable to this or any other city. From a central observatory, wires are run to various stations, and from these stations the timekeepers in given districts are regulated—or, more properly speaking, operated, for every beat of the pendulum of the clock in the central observatory is registered upon the dial of every clock connected with the system. Such a system in New York would be of immense value. It might, if desirable, be connected with the Observatory at Washington, as the Western Union time ball is. But whatever standard might be adopted, it should govern every clock connected with it, just as they are in Paris. We suggest to our horologists that they devise a system to give us uniform time. No doubt the consolidated telegraph companies, whose wires now extend through nearly every street, would be glad to supply the additional wires that might be required. It would be a small expense for them to do so, as the necessary poles are already in position, and the extra amount of wire required would not be a heavy expense. The description of the Paris system will be found interesting, and we commend it to the serious consideration of the practical men of this city who are engaged in clock making. The falling of the time ball at noon, on the Western Union Building, is now telegraphed instantaneously to different parts of the city—why could not the idea be enlarged upon, and electricity so applied as to indicate uniform time upon the clocks used in our houses and places of business? This is one of the conveniences that modern business exigencies require, and the man who first introduces a practical means of doing it is pretty sure to make a fortune out of it.

The Metric System.

To the Editor *Jewelers' Circular*:

I think that the Jewelers' Guild of the United States can do no better service to the jewelry trade than to urge upon Congress the adoption of the metric system. To this end the Guild should petition Congress, and obtain to such petition the names of as many members of the trade as possible. The annual meeting of the Guild is to be held at Rock Island next month, and I hope this matter will be given the attention it deserves. Already the metric system is in use in France and Germany, countries with which our trade is especially intimate; let the United States be the next country to adopt it.

There is no business that requires the metric system more than ours. The meter—especially the centimeter and the millimeter—being more easily applied to the finer subdivisions than the inch. The jeweler can just as well carry away the honor of having made the first move in a matter that must ultimately be adopted by the United States.

KEOKUK, IOWA, April 20.

LOUIS HOFER.

[We heartily second the proposition of Mr. Hofer, and trust the trade will take an active interest in it. The adoption of the metric system as a standard of weights and measures has met with the hearty endorsement of many prominent persons in this country, and a petition to Congress would meet with a cordial endorsement. It has been already adopted in some large manufacturing establishments—notably that of the American Watch Company—because of its greater accuracy than the American Standard. For the informa-

tion of those of our readers who are not familiar with it, we print below the correct tables as contained in the metric system.—EDITOR CIRCULAR.

THE METRIC SYSTEM.

MEASURES OF LENGTH.			
Metric D: centimeters and Millims.		Equivalent in Doomsday in use.	
Millimeter	1/1000 meters	equals	.03937 inches
Kilometer	1,000 meters	equals	3,281 feet and 10 in.
Hectometer	100 meters	equals	328 feet and 1 inch.
Decimeter	1/10 meters	equals	3.937 inches
Centimeter	1/100 meters	equals	0.3937 inches
Millimeter	1/1000 meters	equals	0.03937 inches
MEASURES OF SURFACE.			
Hectare	10,000 square meters	equals	2.471 acres
Are	100 square meters	equals	119.6 square yards
Centare	1 square meter	equals	1.55 square inches
MEASURES OF CAPACITY.			
Names.	No. Liters.	Cubic Measure.	Dry Measure.
Kiloliter	1000 equals	1 meter	equals 1.35 cubic yards
Hectoliter	100 equals	1 meter	equals 1.35 cubic yards
Decaliter	10 equals	1 decimeter	equals 0.0432 cubic ft.
Liter	1 equals	1 decimeter	equals 0.00432 cubic ft.
Deciliter	1/10 equals	1 decimeter	equals 0.000432 cubic ft.
Centiliter	1/100 equals	1 decimeter	equals 0.0000432 cubic ft.
Milliliter	1/1000 equals	1 decimeter	equals 0.00000432 cubic ft.
WEIGHTS.			
Names.	No. Grams.	Weight of what quantity of Water.	Apothecaries Weights.
Millier or tonneau	1,000,000 equals	1 cubic meter	2204.6 lbs.
Kilogram	1,000 equals	1 cubic meter	2.2046 lbs.
Hectogram	100 equals	1 cubic meter	2.2046 lbs.
Decigram	10 equals	1 cubic meter	0.22046 lbs.
Centigram	1 equals	1 cubic meter	0.022046 lbs.
Milligram	1/1000 equals	1 cubic meter	0.0022046 lbs.

The Horological School of Glashütte, Saxony.

THIS institution is near the completion of the third year of its existence. This period has been one of decided progress, and the 1st of May, the beginning of the fourth school year will be combined with the inauguration of the new building erected for the School. It is beautifully situated in the middle of a town of which it forms a prominent ornament. The building ground is a donation from the community of Glashütte and there is ample room around it for a nice garden. The building has a length of 27 M. by 13 M. width. It contains four large rooms for practical pursuits and two for lectures and drawings, besides a spacious library and museum, a director's office, and accommodation for two teachers and a small number of pupils. The cellars are large and spacious, containing bathing and washing arrangements.

The cost of the building has been provided by a donation from the Central Union of the German watchmaker in the amount of about 8000 marks, collected by subscription, and a donation of 12000 marks from the government of Saxony. The remaining 22000 marks have been procured by a mortgage on the building.

According to the demands for admission received up to the present time, the number of pupils will be about fifty for the new school year, and it is gratifying to see how the school is more and more sought by pupils from other countries. Among the pupils admitted for the 1st of May, there is one from Russia, one from Holland and one from Switzerland, while correspondence is progressing relative to admissions from Norway, Belgium, Austria, Luxemburg and Poland. One of the actual pupils came here from Sydney. Pupils who attend without knowing the German language can be received in Mr. Grossmann's house to be instructed until they are competent to follow the lectures and instructions given by the School.

All the theoretical and practical classes are in the most competent hands and all that can tend to facilitate a systematic understanding of horological matters is in readiness to serve the purposes of the Institute.

It is German Horological School differs in its programme from the Horological Schools of Switzerland. These latter are essentially calculated to serve as centers for the educating of young people for the wants of their local industries, while the School of Glashütte is got up with the intention of giving a general and harmonious education in horology to all those who remain a sufficient length of time. A thorough instruction in the most important languages is also a feature which distinguishes this school to its advantage from those of similar kind.

The Jewelers' League.

We devote this column to the interests of the League and its membership. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will be herein answered. Address *Jewelers' League, Box 4291, P. O. New York*, or the office of *THIS CIRCULAR*.

The action of Governor Cornell, of this state, in vetoing the Duguid bill, (the text of which we gave in full in our May number) and which we took occasion to criticize, was still further condemned at a mass meeting of the various charitable and benevolent societies held in the great hall of the Cooper Union in this city on April 22.

The assemblage was large, earnest, enthusiastic, and responded warmly to the points made in favor of such organizations as the League, by the speakers, Hon. Elizur Wright of Boston, Rev. Dr. Hepworth, Rev. Dr. Collyer of Brooklyn, and Chauncey Shaffer. The meeting culminated in a series of resolutions reciting the danger which was apprehended, if the societies were not protected from the menaces of those whose interest it was to have them crushed out of existence, and demanding protective legislation. Copies of the resolutions were immediately forwarded to the Governor and to each member of the Legislature; the same sentiments were expressed by all the societies in central and western New York.

After a sufficient interval for the Legislature to have become impressed with the importance of the interests of nearly 400,000 men in this state, members of such societies, the alert Mr. James A. Cheney, of the Jewelers' League, notified the delegates from the western and south-eastern parts of the state, who had held themselves in readiness to respond at the proper time, to come to Albany. Accordingly on May 4th at 10 o'clock A. M., as pre-arranged, the delegation from New York City, consisting of Jacob C. Parsons, the founder of the Bank Clerk's Association, Gilbert T. Wogolm, President of the Jewelers' League, and the counsel of the Union, Abel Crook, and Ex-Judge John B. Haskin, met the delegation from Syracuse, consisting of Genl. Bruce, of the Syracuse Standard, Secretary Joseph N. Page, and counsellor Brown, in one of the committee rooms of the capital, which, through the courtesy of Mr. Cheney was secured for that purpose during the session of the delegation. Prior to the members coming together, however, they employed themselves in "interviewing" several prominent Senators and Assemblymen, and from them learned that although there was no doubt of the Duguid bill passing the assembly over the Governor's veto, its passage in the senate was problematical by reason of the existing political complications. They therefore immediately upon convening addressed themselves to the task of framing a bill which, while it gave ample protection to the legitimate charitable and benevolent societies, should not only protect them from, or make it possible to project against them, the legislative and judicial assaults in the interest of the great life insurance corporations, should at the same time prevent scheming and designing parties from organizing or operating societies in the interest of a few salaried office holders or agents, without the remotest idea of mutual benefit, except as a cloak for their machinations. After a prolonged deliberation, remarkable for the good feeling and unanimity of purpose developed, and after an amicable discussion with Superintendent Fairman of the Insurance Department of the state, who was invited to be present, a bill was finally prepared which, while carefully protecting the societies, met with his full approval. In the absence from Albany, of Mr. Duguid Ex-Speaker Thomas G. Alvord presented the bill in the assembly on the 5th, and but for the objection of Robert Ray Hamilton it would have passed to a third reading without being printed. His extraordinary perverseness, which will doubtless be remembered by his constituents, made it necessary to print the bill, which was done with a celerity which could be shown only by someone interested in the success of the bill, for it was completed at 4 o'clock P. M. on the 5th, came up for action and passed the assembly on the 6th; on the 10th it was passed by the senate, went to the Governor on the 11th, and on the evening of that day was signed by the Governor and is now a law.

Mutual benefit societies may now pursue their beneficent work in

peace, assured that the power developed by them, which has surprised themselves, will in future be exerted for their protection in the Union of Mutual Benefit Societies, and in which the Jewelers' League is represented.

One of the members of the delegation at Albany volunteered the opinion on account of the class of men who are its members, its rapid growth and its immunity from death loss, (having lost but five members since the date of organization, May 26th, 1877), that the Jewelers' League is the "banner society."

At the last meeting of the Executive Committee, held on May 6th the following candidates were admitted:

O. F. Dolan, Attleboro, Mass.; Frank L. Cady, Mansfield, Mass.; George L. Ford, Frank C. Gerlach, Boston, Mass.; Chas. I. Loveren, Medford, Mass.; Rudolph Richner, Roxbury, Mass.; John A. Abbott, Samuel W. Grimes, Taunton, Mass.; George E. Luther, Frank Bufinton, Wm. L. Ballou, Providence, R. I.; Wm. P. Stowe, Bridgeport, Conn.; Henry A. Deming, Hartford, Conn.; Samuel Aufhauser, Samuel W. Christie, Abraham H. Engel, Charles S. Fitch, Adolph S. Freund, Edwin J. Isaacs, Chas. E. Moody, Adolph Thommen, Edward Trier, Henry Untermyer, John S. Walkinshaw, New York City; Theo. G. Walpuski, Auguste Calame, Bruce Bonney, Brooklyn, N. Y.; Fred A. Clough, Isaac W. Haight, Auburn, N. Y.; Robert Collingwood, Elmira, N. Y.; J. L. Judd, Cortland, N. Y.; Edward W. Matheson, Kingston, N. Y.; Geo. Smith Rice, Saratoga, N. Y.; Chas. H. Schiller, Utica, N. Y.; Nelson Shafer, Cobleskill, N. Y.; Wm. R. Smallwood, Gowanda, N. Y.; Oscar E. Ward, Phoenix, N. Y.; John F. Cadmus, Hackensack, N. J.; George R. Hall, Uniontown, N. J.; John W. Fahr, Thomas Greason, Jason K. Smith, Charles Weller, Vincent M. Wright, Newark, N. J.; James H. Fleming, New Jersey; Thomas B. Hagstoz, Camille Kibele, Chas. H. O'Brien, Philadelphia, Pa.; Otto F. Heeren, Pittsburg, Pa.; Luther Orchard, Scranton, Pa.; Thos. F. Weale, Baltimore, Md.; Stephen Thomas, Jr., Joseph M. Thomas, Charleston, S. C.; George R. Caspari, Louisville, Ky.; Henry A. Brahe, Augusta, Ga.; Albert F. Murray, Huntsville, Ala.; Theodore A. Iler, Jackson, Miss.; Gustave Kreih, New Orleans, La.; Joseph Ling, Sherman, Texas; Henry L. Warren, Solomon Nusbaum, Delbert H. Bust, Cleveland, O.; Coelestin Trenkley, Fort Wayne, Ind.; Jacob Floersheim, L. P. Jensen, Isaac W. Nichols, Wm. N. Shute, Wesley W. Wilcox, Chicago, Ill.; Wm. H. Cloudman, Hiram Thomas, Elgin, Ill.; Wm. S. Sparrow, Grand Rapids, Mich.; Chas. Bachman, Ottumwa, Iowa; Arthur G. Wiseman, St. Louis, Mo.; Andrew Myers, Springfield, Mo.; John Baumer, Omaha, Nebraska; Chas. R. Talcott, Olympia, Washington Territory. This last named member is number 1250 on the membership roll—half way the full limit of membership.

Amount paid to beneficiaries, \$7,333.95.

Amount now in Benefit Fund, \$7382.65, (for payment of next death loss).

Amount in Treasury in addition to the Benefit Fund, \$1,986.71.

Amount in Trust, (Permanent Fund), \$50.

Members accepted at the meeting held May 6th, 1881, 76.

Applicants rejected 2.

Applications laid over for investigation, 13.

Membership at present, 1254.

The Discrimination and Artistic Use of Precious Stones.

BY PROFESSOR A. H. CHURCH, F. C. S.
From *The British Horological Journal*.

IT was not without set purpose that I associated a scientific and an artistic conception in the title of this paper, for I am desirous of making a contribution, though it be but a small one, to the intelligent study and intelligent employment of precious stones. And I am convinced that some acquaintance with the less obvious qualities of well-known gem-stones, and with the distinguishing characteristics of those species which remain practically unrecognized and unappreciated, will help forward the improvement of the jewelers' art in this country. Most admirable and pleasant color combinations are

obtainable by the aid of materials which, in many cases, are now by no means costly. Curious and delicate hues, of luminous quality, and in enduring substance, may be arranged and grouped in forms of endless beauty and variety. Neither silks nor paints, nor even enamels, can ever equal the colors of precious stones in durability, or in brilliancy and pulsating variety of hue. By pointing out some of the methods of discriminating one stone from another, I hope to be able to explain the modes which I shall cite or suggest, for their artistic employment. But I hope to do more than this. For when we know something about the intimate nature of any art-material, we begin to feel a more intelligent and a more lively interest in examples of good workmanship wrought in the substance in question. Every connoisseur or collector of artistic objects must have shared in experiences of this kind. He may have been once quite dead to the peculiar merits of certain works—say, in bronze, not even glancing at any specimens falling in his way. Then some casual circumstance, perhaps an exciting contest for a fine piece of work at a sale between two enthusiastic collectors, or perhaps the gift of a choice specimen, may have drawn attention, I will not say to the merits of such specimens, but at least to the esteem in which they may be held. Curiosity—it may be an intelligent curiosity—is excited. Investigation, more or less searching, follows. The hardness of the metal, its *provenance*, its designer, its age, the mode of manufacture, whether by casting or hammering; the manner of decoration, whether by chasing, engraving, or inlaying; the color and texture of the surface, the presence or absence of *patina*, and not a few other points of interest constitute the materials of complex study. Study provokes observation, and observation study, so that before long the neglected group of artistic bronzes exerts a kind of fascination upon the new votary. If his knowledge be superficial and inaccurate, or if he be merely an amateur or collector just because it is a fashionable pursuit to gather together or to admire certain classes of artistic objects, well, then, he does not really know what and why he admires. Forgeries delight him just as much as genuine works, so long as he is not sure that they are forgeries; but he has not sufficient patience for the mastery of, or sufficient insight into, the characteristics of true productions, to discriminate them from those that are false. It often happens thus with the amateur of precious stones. He knows nothing of the optical elements, say, of surface lustre, and the pleochroism which go to make up the *tout ensemble* of any particular gem, and is quite satisfied with a well-cut bit of paste, or a cleverly contrived doublet. No doubt, in some cases, even an educated keenness of vision does not suffice to distinguish the true stone from the false, although the durability of the genuine specimens will ultimately prove their superiority. But it is not difficult to learn to appreciate the peculiar and essential characters of the majority of precious stones. What I wish to compass to-night, has, then, not merely relation to the artistic use and arrangement of gems, but also to an appreciation of their inherent characteristics, so far at least as the effect their appearance. I want to sketch these characteristics, and then to compose them into pictures. For this purpose I have set down, in some sort of order, the most valuable optical distinctions belonging to precious stones, arranging these under the general heads of "Surface" and "Substance":

1. Plane.....	FORM..	SURFACE	
2. Curved.....			
3. Metallic.....			
4. Adamantine.....			
5. Resinous.....			
6. Vitreous.....			
7. Waxy.....			
8. Pearly.....			
9. Silky.....			
10. Transparent.....	LIGHT.	SUBSTANCE.	
11. Translucent.....			
12. Opalescent.....			
13. Chatoyant.....			
14. Opaque.....	COLOR.		
15. Prismatic.....			
16. Monochroic.....			
17. Pleochroic.....			
18. Fluorescent.....			

I will now proceed to give some examples of the use of such a tabular statement as this. Referring to the shape of stones, we note that their boundaries are either plane or curved. Now, if we want to use curved surfaces, like those of pearls, we shall find that it will not answer to associate with them other curved surfaces, like those of the *en cabochon* moonstone; and especially is this the case where the size of the stone as well as the character of the curved surface is nearly identical; but a happier result will be obtained by combining a step-cut stone with one having a curved surface. Once more, citing an example from the series of adjectives expressing qualities of surface, it will be found that gems having an "enchat" lustre will do better with those which present the less brilliant surface known as waxy, than they do with those which show a nearer approach to the adamantine surface, and which are called resinous. The diamond and the jargon are not to improve or bring out each other's qualities, for they have too many points in common; but the diamond accords well with the pearl, and the jargon with the turquoise, that is, the adamantine with the pearly, and the resinous with the waxy. Looking, now, into the substance of stones, rather than on their surface, the relations to the transmission of colorless light furnish many illustrations of wise and unwise, or effective and defective combinations. For example, chatoyant stones, like cat's-eyes, do not associate well with translucent stones like the chrysoprase and the chalcedony—the translucency of the latter confuses, because it resembles too closely the chatoyancy of the former. But transparent stones accord well with all those which interrupt the passage of light by such internal reflections. The diamond, on this account, combines admirably with the cats-eye and pearl, but it affords too strong a contrast, especially when of large size, with the turquoise, to associate pleasantly with this nearly opaque stone. From amongst the qualities pertaining to the color of stones, examples of the utility of my table may be cited. When a stone has a "fine" in—that is, when its refractive and dispersive actions upon light are high—and it shows prismatic hues, then it looks best if associated with gems in which this property is less developed. Again, monochroic stones, which in all directions transmit beams of the same color, should be associated with pleochroic stones which exhibit two or more hues, while the latter should not be mixed together.

It may be useful, as an introduction to the study of individual precious stones, to say a few words concerning the physical experiments by aid of which qualities can be best ascertained and discriminated, where, in fact, we cannot employ or wholly trust to the eye. The materials required for such experiments are very simple, and include—

a. A set of mineral fragments—diamond, sapphire, spinel, chrysoberyl, topaz, garnet, and quartz—to be used as tests for relative hardness.

b. A small pocket spectroscope, by which absorption bands, as those of the garnet and jargon, may be detected.

c. A dichroscope, by which the pleochroism, or difference of color in the light transmitting in different directions in the same stone, may be ascertained.

d. Liquids or easily fusible solids, of high specific gravity, from 2.3 upwards, by means of which the difference of different densities in doubtful specimens may be easily accomplished.

The applications of this critical apparatus to the discrimination of certain precious stones will be mentioned further on, in connection with particular species.

(To be continued.)

Graining in Silver Plating.

THE graining of movements by silver powder requires practice, to produce a uniform grain, and a watchmaker, who has only at odd time to perform such work, is apt to have not the experience necessary. The following method is safer and accomplishes the same end. Like parts of nitric and muriatic acid, wherein a small amount of cooking salt has been dissolved, produce a finely grained surface upon brass, copper &c., a stronger graining can be had by an additional quantity of salt. The articles of course, must, before the operation be ground and cleaned; they are then tied to a horse hair and suspended for a few seconds in this acid mixture, then quickly drawn out and thrown into warm water, and are finally scratchbrushed with beer. This scratchbrush may be of fine brass, German silver, wire, or spun glass. It is advisable to galvanize silver plate the articles only thinly; thoroughly scratchbrush them again, and then gold plate them, whereby an evenly grained surface as well as a pretty and durable appearance is produced.—*H. Bush, Hull.*

To Regulate a Watch for Common Use.

BY MORITZ GROSSMANN,

Watch Manufacturer, Member of the British Horological Institution of London.
Honorary Member of the Upper Italian Horological Union Gaielli.

[Continued from Page 94.]

Many other contrivances to facilitate the comparison of the vibrations have been made use of. The *Revue Chronométrique* proposes a sort of standard balance which swings in the customary manner under a bridge, screwed upon a plate, and which may be regulated to make the required number of vibrations per hour. The plate upon which the balance bridge is fastened is large enough to accommodate the spring on trial, and this is done in such a manner that two arms of the several balances stand on a line when at rest. Both balances are impelled simultaneously, and thus the least deviation of their vibration may at once be detected, because the arms cease to pass a common line at the same time.

When, therefore, a suitable spring has been chosen, and its exact length ascertained in the above manner, a half a coil is added, and the superfluous broken off. Sufficient is also removed from the inside to admit the collet, and the inner end is bent so as to be on a line with the collet hole. Next file a good round and tapering pin of hard brass, fit it into the collet hole and mark it at the places of entrance and exit. Take it out again and file notches at the two places. Flatten it a little on one side to accommodate itself to the end of the spring to be fastened in the collet. When done insert the pin into the hole until its flat side lies upon the end of the spring, break it off at the notches and press it in firm.

Next place the collet and spring upon an arbor, and bend it flat and circular, by the eye. Then let the arbor revolve in the lathe and observe if the spring runs well from the side, and after this has been obtained by suitable bending of the inner coil, pay attention that all coils of the spring run equally round. At first sight this appears to be impossible, because the spring does not consist of concentric rings, and consequently its coils cannot run circular, in the common acceptance of the word. Anyone, however, who wishes to take the trouble to try this method, may easily convince himself how equally the coils arrange themselves centrifugally or centripetally, according to the direction of the tool, while by a spring not fastened concentric such an appearance will not occur. Such an incorrect shape must be altered in no other way than by bending the first half of the inner coil. It should always be borne in mind that a good spring will run circular of itself, and only appears to be out of round on account of an unconcentric fastening at the collet. A satisfactory motion of the spring is quickly obtained and any faults corrected by bending at the inner fastening point.

The location and direction of the collet hole is apparently an insignificant thing, yet it is worthy of all due attention. It should always end in the cut near the collet, and be drilled straight, so as to have outwardly a sufficient darkness of wall, and the hole should under no consideration be visible from or open to the inside. The cut in the collet is made use of by most watchmakers to turn it when it has

been fastened upon the balance. For this purpose a small screwdriver is inserted in the cut, and doing thus, disturbances might be produced, leading to bendings of the spring, if its inner coil were located close to the cut. No difficulties will take place if the hole commences near the cut in such a manner that the inner coil at the cut is farthest from the collet. The hole in the collet by which it is



fitted upon the balance, should be as long as possible, to securely retain it in position and at the same time permit it to be slightly turned. Due attention should be given to choose a good sized spring; also a Breguet should have good proportions in size.

The flat spring, together with the collet, is next placed upon the

balance and pressed down until well firm; the balance is located in its place, and the bridge screwed down. In this condition the outer end of the spring should of its own accord enter into the stud hole, when the balance is moved in a corresponding direction, if not, the spring is apt to assume a cramped and forced position when fastened. It is well to retain a certain superfluous length of spring, which may, without exerting any influence, protrude from the other side of the stud. The outer spring end is next fastened in the stud with a pin made and treated in accordance with the directions given for securing the inner end.

A spring well fastened at both ends gives when in motion a clear sound. If the outermost coil is to be bent upward (Breguet spring), equally place it upon the balance and this into the watch, then measure with some small object the height from the spring's upper surface to the hole in the stud. This is commonly done by using a small screwdriver, of which a good workman always has a graded assortment on the bench. When the height has been found in such a manner, the spring is removed, after having carefully observed over which one of the coils is the stud hole. Lay the spring flat upon the table; hold it down about one turn from the outside with a strong pair of tweezers, and draw the end up so that it stands sloping. Place the height gauge on the spring, find where at the upward turning end the place is, turn the spring, seize it at this spot, and draw the end up again, restoring the outer coil to a bevel with the spring's surface; then bend this outer coil inward and bring it into a concentric circle whose radius is the distance between the balance hole and the stud hole. Try, as is done by flat springs, if the outer end enters the stud of its own accord; if it does, fasten it in the manner described.

Care must be had to bend only a part of the outer coil over the others, and that it stands entirely free and at an adequate distance over them. If it is otherwise, the inclined part of the spring would with every vibration impinge with the proximate coils, and a grinding would be produced, impeding a free development very materially and an exact regulating under such circumstances is simply out of the question. The sharp corners given by the Swiss to these springs, and considered by them a proof of superior workmanship, is utterly to be condemned, as the molecular and elasticity must necessarily be disturbed at those places. It is preferable by all means, to let the outer curve rise up gradually.

CHAPTER III.

OBSERVATION AND ANNOTATION OF RATE.

Having found and fastened a spring in the manner above described, our next duty is to observe its rate, that is, compare it with that of some standard timekeeper. It is of great assistance if the watch under treatment is provided with a seconds hand. If not, ascertain by counting the number of leaves, if the center pinion makes one revolution per minute. This is the case if the number of the center and third wheel teeth, divided by the number of the third and fourth pinion leaves, gives 60. For example, if the center wheel has 64, and the third wheel has 60 teeth, the third and fourth pinions have each one 8 leaves, we obtain $60 \div 8 = 7.5$ the revolution number of the latter pinion per hour; because $64 \div 8 = 8$. If any other sum is obtained by this calculation, only the observation of the minute hand remains for our guide.

If the observer intends to derive any practical benefit from his comparing and observation, it is imperatively necessary to carefully mark down results obtained. Even when finishing the regulating at one time, it would nevertheless be very difficult of execution, when doing other work, to so closely remember the rate of the watch under treatment, as to compare it with rates in other positions. Every uncertainty demands a repetition of the observation, and thus is connected with loss of time. The difficulty increases with the number, and it is best to note the rate of every one, and to designate them by some distinguishing mark. Even under the very favorable condition that the watch has no seconds hand, and the calculation of the wheel work offers no assistance, a close observation of the minute hand will materially expedite the work. Place in the hands as close as

possible, and observe the minute hand with a glass when it passes a line of the minute division on the dial. Such a passage may be observed within one or two seconds, and should be noted. After the lapse of one hour, and exactly the same minute, repeat the operation. If any other minute were chosen, the additional risk of an incorrectness of the dial, which is sometimes important, would be run, and taken into account. As an observation at the exact minute is easily neglected, and another hour would have to elapse for a repetition, it is better to take another observation a few minutes later, and also to commit it to paper, that, in case the time for a comparison of the first has elapsed, we still have another one; if both are made, and the mean taken, the observer has a reliable result.

If the watch has no seconds hand, but is so constructed that the fourth wheel makes one revolution per minute, another proceeding may be adopted.

Make a point in the fourth wheel with a fine hard point, or mark a point with a little red stirred with oil. Now observe, by looking straight down on the marked spot on the wheel with the glass, the passage of this place under some fixed part, and jot down the result. It is not necessary to wait an hour when following this method, and the practiced eye will obtain results as close as one-half a second. But a watch with a seconds hand can be compared easiest and closest of all. The observer, with a little practice, may come within a tenth part of a second, by stepping with watch in hand close to a standard clock with seconds pendulum, listening to the ticks of the pendulum, and following with his eyes the movement of the seconds hand. It is well, even in such a case, to compare rates at the same place of the seconds dial, so as to exclude the possibility of any incorrectness of the dial division.

Having mounted a new spring, let it, not to waste time uselessly, go for three or four minutes and compare again. The difference of a second amounts to six minutes per day, and the watchmaker will at once know whether to let the spring retain its full length and correct the difference by the regulator, or if it must be lengthened or shortened. Such cases are never done at the outer coil end, and only in very exceptional cases is the inner one ever touched for correction.

When the watch is nearly regulated, suffer it to go for several hours without disturbing. Then compare the first observation with the second, that is, find the difference which the watch has made between these two periods. When progressed so far as not to exceed 10 seconds per day, let at least six hours elapse between periods of observation.

(To be continued.)

A New Method of Swindling the Trade.

SEVERAL firms in the plated goods trade have recently been swindled by some shrewd operators. The following sketch shows their mode of operating and how they were caught:

Last November Rogers & Bro., received an order purporting to come from a party in Yonkers, N. Y., amounting to about \$150. As the party was a stranger to the firm, although having a fair rating on the Mercantile Agency, they requested that he either furnish them satisfactory references or remit the amount of the bill, on receipt of which they would furnish the goods. After the lapse of several months that letter was returned to them through the Post Office as not belonging to the genuine party to whom it was addressed. In December Rogers & Bro. received an order for \$2,500 worth of goods written on the printed letter head of H. V. Maynard, Norfolk, Va., who very generously left the selection of the goods to the good taste of the firm, and stating that he had leased an elegant store in Norfolk, and had \$10,000 cash capital in currency, which at that time was lying in the Adams Express office at Norfolk for safe keeping. Although proposing to pay for the goods in 30 days, there were some particulars about the order which aroused considerable suspicion, but by application to the Agency and other sources they

ascertained that the money package was at the Adams Express Co., as stated, but nothing could be found regarding the antecedents of H. V. Maynard, whereupon Rogers & Bro. wrote him that they should require some reference from him in order that they might know with whom they were dealing, or else they would ship the goods on receipt of the cash. To this letter Maynard replied in a coarse, abusive manner, feeling highly insulted that his credit should be questioned, especially when he had so much money lying ready to pay his bills, but inasmuch as he evaded or declined to give the required information, he was notified that his order was canceled. In less than a month they received a telegram from Norfolk stating that he had received and disposed of large quantities of goods and had suddenly left the town for parts unknown; just before leaving he sent another order to Rogers & Bro., saying that he could not get along without their goods and requested that a bill of about \$300 worth of goods might be sent to him, for which they could draw at sight, to which order Rogers & Bro. informed him as before, that they must have reference of the cash. About this time J. W. Johnson, No. 13 John street, had been swindled out of \$200 worth of plated goods by a bogus order purporting to come from E. W. Landis, Reading, Pa. On April 18th Rogers & Bro. received an order purporting to come from F. F. Neal, Cleveland, Tenn., for \$200 worth of their goods, but inasmuch as the goods ordered were of a finer class than usually kept in such small towns, the firm had their suspicion somewhat aroused. Upon comparing their letter with the one received by J. W. Johnson, the writing was found to be the same hand, and many of the phrases were exactly identical. Rogers & Bro. wrote to this F. F. Neal, begging a few days indulgence in filling his order; in the meantime learning that Reed & Barton, The Meriden Britannia Co., and nearly every other house in the trade had been swindled by this gang, and some of them *twice over*, they furnished the information as to their whereabouts, upon which Pinkerton's Agency was employed, who within three days arrested the parties and brought them to New York. They have given false names, but it is believed their true names are Myers and Donaldson, and that they belong to Rochester, N. Y. They have made a full confession and will probably spend this and several more summers at the State Hotel at Sing Sing.

How to Make a New Fork.

TO the question of a correspondent how to make a new fork, Mr. Sievert responds as follows: I suppose the interrogator means a fork for a watch already made. The depth distance, the radius of the lifting circle (on the balance), and the angle of motion of the anchor can easily be ascertained by actual measurement. The effective length of the fork can be obtained from these factors, either by the construction of a triangle or by a trigonometrical calculation. They are used as follows: With a fine steel point draw a center line upon a well prepared and smoothed metallic plate, intended for the fork; mark the center of motion with a sharp point, and from this center, using the effective length of fork as radius, describe a circle. This gives you exactly the outer corners, or horns, of the fork's notch; next measure the breadth of the ruby pin, add 1-10 mm. for necessary stake, and sketch the size so found of the breadth of the notch equally one-half upon either side of the center line. The point of the guard pin must also be located truly upon the line. Thus you have found the main part of the fork, and you may begin to file out. The rounding of the horns is best done with a round file whose diameter stands to the effective diameter of the lifting circle as 5 : 9. Extreme care is necessary when filing out to make the article corresponding the sketch, and the workman may count upon its fitting. It must be remembered that by a proportion of 1 : 3 of the acting lifting faces, the point of contact takes place at about 1-10 mm. within the notch, and very exact measures are necessary (I use a decimal measure made at Glashütte, and a millimetre slide with circle points); to be sure of his work, the repairer had better try at times before, perhaps, he makes the horns too short. There are many anchor watches of so faulty a construction, that it is almost a pity to make a new fork alone, without at the same time replacing the table roller.

The Travelers' Club.

THE second meeting of The Travelers' Club was held at the peaceful abode of the gentle restaurateur in John street, May 30. Charley Hawkins, with whom the idea of a club originated, and who acted as temporary chairman of the first meeting, was present, and assumed the gavel until a permanent President should be chosen. There were also present Joe Watkins, asthmatically wheezy, as usual, and half a dozen other traveling salesmen who had read the account of the first meeting in THE CIRCULAR, and were desirous of becoming members.

The chairman called the meeting to order, and announced that he had received communications from several travelers thanking him for having started a club which they could call their own, and asking to be admitted to membership. These communications, he said would be read in due course of events. As to the persons here desiring membership, they would have to wait until the constitution and by-laws were adopted before they could be voted for.

"Mr. Chairman," broke in Joe Watkins in his assumed Irish brogue, "Fhwat fur shud these gentlemen be kept waitin'? None uv us was voted fur, why shud they be? We all know 'em, an' we all know they are travellin', an' they've as much right to be mimbbers uv the Travelers' Club as any ov us. I move you, Mr. Chairman *pro tempore*—I wán't you to moind the *pro tempore*, for you're not prisdent yet—that Jimmy Fish, Dan Newman, Charley Blake, P. Tertius Dutton, Johnny Thompson—wid a p—and Hank Rogers be considered as original mimbbers and intitled to vote from this time forth furevermore, an' may the Lord have mercy on 'em."

The chairman said unless there was some objection it would be so ordered, and the gentlemen named were requested to have their mugs filled and participate in the proceedings.

"At the last meeting," continued the chairman, "Billy Bowers was appointed a committee of three to draw up a constitution and by-laws. Billy is off on his western trip, but I received a letter from him, which I will read. Billy believes in this club, and means biz, as you will see from the amount of soul he has thrown into the by-laws."

Indianapolis, May 15, 1881.

Charles Hawkins, Chairman Travelers' Club:

DEAR OLD DUFFER—"Members of the Club will please notice that such familiarity will not be permitted," interpolated the chairman. Here I am taking a run through the country and trying to sell goods instead of getting ready to meet the Club next week. Trade is awful dull this way—too much snow and ice and things for the season. I didn't forget that I am an important committee—to prepare constitution and by-laws. Sat up all night in Cincinnati writing 'em out, and enclose them with this. Hope they'll suit. Fix 'em over as you choose, I shán't be offended. Am in a hurry to wait on a customer—must sell some goods, so good bye. Love to all the boys.

Yours fondly,

BILLY BOWERS.

P. S.—I enclose a little poem which I clipped from a paper a day or two ago, and which I think should be preserved in the archives of The Travelers' Club.

B. B.

"The business in order will be the reading of the constitution and by-laws as submitted," announced the chairman. "I will now read them, and will then listen to any amendments that may be suggested.

CONSTITUTION.

ARTICLE 1—This Association shall be known as the Travelers' Club.

ARTICLE 2—Its object shall be the promotion of social intercourse between its members.

ARTICLE 3—This constitution is considered strong enough to stand any weather, but whether it will or not, it may be revised, corrected, extended, expanded, interpolated, contracted or curtailed at the option of two-thirds of the members present at any meeting; *provided* that at least one member shall be in attendance when the deed is done.

BY-LAWS.

SECTION 1—The membership of this Club shall consist of the traveling salesmen of houses connected with the jewelry trade.

SEC. 2—Ex-travelers and such other fellows as the members choose to elect, may become honorary members.

SEC. 3—The initiation fee shall be fixed by vote on each application, but never shall exceed the usual beverage for those present. Honorary members shall pay the same with cigars added.

SEC. 4—The officers of the Club shall consist of a President, Vice President and Secretary.

SEC. 5—It shall be the duty of the President to preside at all meetings of the Club—if he chooses to do so. It shall be the duty of the Vice President to make the President preside whether he chooses to or not.

SEC. 6—It shall be the duty of the Secretary to keep a record of the meetings of the Club and do as the members tell him to.

SEC. 7—Members are expected to do as they please at all times, and if they do not, the officers will compel them to. Failing in this the President shall be fined an amount sufficient to pay for the next round.

SEC. 8—But we don't want too many by-laws. "Enough is as good as a feast." / "Sufficient unto the evil is the day thereof." "An honest man gathers no moss." Yours, truly, BILLY BOWERS.

The chairman remarked that he thought Billy had got that last section a little mixed. There is a little incongruity in some of the sections, but like the faults of youth, they will be corrected as we grow older. I declare the constitution and by-laws adopted.

Charley Blake attempted to move a substitute for one section of the by-laws, but was immediately fined cigars all round, whereupon there was no further opposition.

The next business in order was the election of officers, which resulted in Charley Howard being chosen President, Joe Watkins Vice President, and P. Tertius Dutton Secretary.

Having accumulated the correspondence received up to date, the Secretary read the poem sent in by Billy Bowers, as follows:

"MY PARTNER."

READ AT THE ANNUAL BANQUET OF THE COMMERCIAL TRAVELERS' ASSOCIATION, OF IOWA, BY PRESIDENT BANKS.

Friends I've a story to relate
About one of the boys. I'll state
Right here, 'tis short.
Near as I can I'll tell the tale
Just as I heard it. Should I fail—
But no—without excuse I'll sail
Straight into court.

A commercial man, on sales intent,
Into a country store-house went,
With smiling face and bland;
Right thro' the crowd about the store
Straight on the merchant's desk he drove,
His "grip-sack" on the counter heave,
And shook the merchant's hand.
Then, while his tongue ran quick and fast,
Upon the merchant's face he cast

His most persuasive look;
Pleading the while, "I'll gladly show
My pleasing line and prices low.
He spread his samples in a row,
And op'd his order book.

Erstwhile a form came through the door,
In clothing tattered, old and poor,
And happening to the spot
Where, by his wares, the traveler stood,
Seeming in an inquiring mood,
Asked not—"please, sir, do I intrude?"
But fingered o'er the lot.

The sample man, with darksome frown,
Gazed on the seedy hat and gown,
That clothed the country man.
And when he asked, in gentle way,
"What is the price of this to-day?"
Turned quickly on that sinner gray,
And thus to him began:

"Pray what is that to you, grayhead?
I represent the wholesale trade;
Why—look—you can't not buy.
D'you know, old man, you're too fresh—quite?
My goods would be in pretty pligh
Had every man the right
To handle them—come, fly."

The old man turned his glass-trimmed eyes.

With steady look of mild surprise.

Upon the man of ire;

Then, as on some deep thought intent,

Turned slowly round, and silent went

Back to the stove, where, forward leant,

He warmed him o'er the fire.

"Bah!" said the traveler, "what a boor,

Such men I never could endure;

A plague on them I say."

The merchant smiled, "I fear," said he,

"With you I hardly can agree."

"Why?" "Oh, because he is, you see."

My partner, sir. Good day."

Joe Watkins, whose newly acquired dignity of Vice President could not cure him of his "swate Irish brogue," said: "Byes, at the last matin" I was axed fur to invite all the byes in town to jine the Club. Well, I did it, and wots more, I wrote to a lot uv 'em besides to send in shories and reminiscences of their travels to make things lovely loike. Well, I have some letters from 'em that will be read by the Secretary. But I want to give notice to all the byes on the road that we'll be glad to hear from 'em any time. Address your letters to "The Travelers' Club, care JEWELERS' CIRCULAR, 42 Nassau street, N. Y.," an' they'll rache us all right. When you see a good joke in the papers, cut it out and send it to the Club. We all like fun, an' a joke's a good thing to have wid us all the toime. In this way we can make the Travelers' Club the liveliest place in the city. Only everyone must contribute something as often as he can.

The Secretary next read the following letter:

New Orleans, May 6, 1881.

MY DEAR JOE—"That's me he refers to," said Watkins. I received your letter about the Club—splendid idea—count me in. Elect me a member as quick as you can. Meantime here's something for you. You all know George Strong, of this city; jolly good fellow as ever was, knows how to treat a fellow like a white man. By the way, did you ever hear about George's new steam engine? New idea of his—he shows it the machine, not the idea—to all his friends who call on him. George has been a great sufferer from rheumatism. Curses, too, how he caught it. He was riding in the cars, and—but here's the way he tells the story himself.

"My fellow-passengers in the coach from Silver Bow were a merchant of Butte, and old lady, and a Chinaman. The old lady sat beside me on the back seat. On entering the vehicle she had to be assisted in and tenderly handled, as she was suffering intensely from inflammatory rheumatism. After we were fairly started on our journey she told us all about her rheumatism, and exhibited her hands, which were covered with great knots. What I am now going to say may sound ridiculous, but I can't help it. I had shared my blanket with the old lady, arranging it over her lap and my own. We had gone only about four miles when I was suddenly seized with an agonizing pain in my right hand, which commenced to swell, and in a few seconds attained three times its natural proportions, with three great knots standing out on it. I had never been afflicted with rheumatism or anything of that nature, and I was at loss to account for my sudden affliction. I suffered perfect agony, and for a long time could find no means of relief. In the meantime the old lady had grown chipper, and was chatting away as though there was no rheumatism in the world. The thought struck me that I had drawn off her rheumatism. I was a natural supposition, but I shall always think so. The idea came over me that if rheumatism could be transmitted I would try and give the Butte merchant a dose of it. Telling him I wanted him to try an experiment, I asked him to take my right hand in his. He did so, and then with the palm of my left hand I vigorously rubbed the blanket that covered my lap. It may have been fancy but I surely felt temporary relief. The rheumatism did not "take" on the Butte merchant, however. I suffered dreadfully with the hand until Deer Lodge was reached, and from the moment I alighted from the coach the pain ceased, the swelling commenced going down, and the next morning my hand was in its normal condition."

That'll do for this time. Keep the Club moving—will send you more next month.

Yours, just a-blooming,
HARRY SHARP.

The next letter read by the Secretary was as follows:

Milwaukee, May 14, 1881.

TRAVELERS' CLUB—Boys, I'm with you. As Napoleon remarked at the battle of Yorktown, "My soul is up in arms and eager for a fry" I was in Chicago yesterday and made Sted Hale give me his

copy of THE CIRCULAR to read on the road. I struck the proceedings of the Club and lifted up my soul in rejoicing. It's just what we need and ought to have had years ago. We are jolly fraternity, we commercial travelers, and we see all sides of life on the road. It humanizes a fellow wonderfully to meet all sorts of people, and warms a man's heart towards his friends. I believe we ought to cultivate our social qualities more. One of the best ways to reach a man's heart is to place his legs under your mahogany and place a good set out for the stomach in front of him. Here I'll give something for you. The other day I was at a little town in Minnesota, and, while showing goods to a customer, a stranger in the store nipped a seal ring, and tried to make off with it. We caught him, however, and took him before the magistrate, who committed him. I had to stay over a day as a witness, and the fellow was tried in Justice Carey's Court. While the jury was out, the judge and the lawyers were sitting round the stove chatting, and finally got to trying to see which could tell the biggest yarn. A lawyer named Blake led off with a story of his early life in Minnesota. He said:

"I knew an old farmer there who owned ten acres of timber land, where millions of pigeons came each year to roost. They devastated the wheat fields, and the old coon used to catch the birds in nets and thrash them out on the barn floor. Each bird had three ounces of wheat in his crop, and it was a bad year for 'Old Thompson' when he couldn't plant 1,000 bushels of wheat to market at \$2.60 a bushel, and it rained a No. 1 when it reached the Chicago elevator. If there had been a few millions more of pigeons, he would have come pretty near getting a corner on the Minnesota wheat crop."

"I knew a planter down in Alabama," said Kittrell, "who was fully as sharp as that. He trained an alligator to work up and down the river and catch the little picanninies that played along the bank. The alligator would take the little kids in his jaws and swim back to the plantation. It was a dull day that he couldn't corral three or four. The planter raised 'em carefully, and when they got big sold 'em in New Orleans at prices ranging from \$3,000 to \$10,000 apiece. He was rolling in wealth when Lincoln's emancipation proclamation was issued, and after that the alligator never did any more work. The man is now barely keeping body and soul together in Washington, clerking in one of the Government bureaus at \$8,000 a year."

George Carey evinced the greatest interest in these weird tales, and edged up to the group.

"These are curious yarns, gentlemen, but I believe them all. I had a dog once, back in Nebraska, that I kept to herd lumber."

"Beg pardon, Judge; did you say the dog herded lumber?"

"Yes, sir, cottonwood boards. We always kept a dog there to bring the lumber in at night."

Everybody now paid the closest attention, as they knew the boss was at work.

"It was this way. Cottonwood boards warp like thunder in the sun. A board would begin to hump its back up about 9 o'clock in the morning, and in half an hour it would turn over. By 11 o'clock it would warp the other way with the heat, and make another flop. Each time it turned it moved a couple of feet, always following the sun toward the west. The first summer I lived in Brownville, over 10,000 feet of lumber skipped out to the hills the day before I had advertised a houserain. I went into the county seat to attend a lawsuit, and when I got back there wasn't a stick of timber left. It had strayed away into the uplands. An ordinary board would climb a two-mile hill during a hot week, and when it struck the timber it would keep wormin' in and out among the trees like a garter snake. Even after the state had to keep the sheepdogs to follow his lumber around the country, keep it together, and show where it was in the morning. We didn't need any flumes there for lumber. We sawed it east of the place we wanted to use it, and let it warp itself to its destination, with men and dogs to head it off at the right time; we never lost a stick. Well, here comes the jury," continued the Judge. "The witnesses led, so I guess they will disagree."

The chairman here announced that it was getting late, the business of organizing having occupied considerable time, and suggested that the reading of the other communications be postponed to the next meeting. "Before pronouncing the benediction, I wish to again urge upon our brethren on the road, to send us in contributions for the edification of the Club. Now that we are duly organized and officered, it will not be necessary hereafter to burden the record with a report of business transacted, except on special occasions, but the Secretary will content himself with recording the anecdotes, stories, jokes, etc., that are furnished by the members. I declare the second meeting of the Travelers' Club adjourned."

Guide for Watchmakers's Apprentices.

BY HERMANN SIEVERT.

[Continued from page 102.]

THE WHEELS.

The bounding line of a wheel is always circular, and as circles are proportional to their diameters, the circumference of a wheel increases in the exact rate with its diameter. The wheelwork of a watch contains large and comparatively very small wheels, and as is generally the case, a larger wheel will drive a smaller one. These small wheels are called pinions. Each wheel rotates on its axis by means of two pivots; when set in motion by any power, and with its circumference drives another wheel, it acts as a lever whose fulcrum lies in its pivots, or in the center of the wheel. The point of the wheel *f*, (Fig. 4.) receiving the impulse, is the end of one, point *b* at

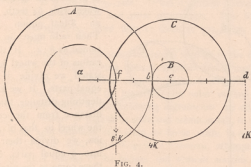


FIG. 4.

the circumference of the wheel, which drives the other, is the other end of the lever arm.

When of two wheels of equal diameter, consequently of equal circumferences, one impels the other, both will move with equal velocity and accomplish their revolutions at the same time. Again, the same amount of power with which the first wheel rotates upon its axis, will be transmitted to the circumference of the other wheel. But as power and weight on levers of equal arms, the radii of the wheels operate, the driven wheel consequently turns with equal force upon its axis.

"Equally large wheels interlocking with each other, change neither the power nor the velocity of the motion."

When, however, of two unequal wheels, whose diameters are proportioned, let us say, as 4 : 1, (Fig. 4.) the larger wheel drives the smaller, this will make as many more revolutions than the larger one, as its circumference is contained in the latter, because the velocity at the circumference remains the same. When, therefore, the large wheel rotates once upon its axis, the small one rotates four times.

Suppose the large wheel *A* turns round its axis with a power equal to a pressure or a weight of 4 pounds upon its circumference, therefore at the end of the lever arm *ab*, it would operate with the same pressure upon the circumference of the small wheel (pinion) *B*. Since the power thus communicated to the pinion exerts itself with a force four times less upon the short lever arm *bc*, this pinion must move with a power four times smaller. While the rotation power of the wheel *A* at the lever arm *cd* was equal to 4 pounds, that of the pinion of the lever arm *cd* of equal length will be counterbalanced by a weight of 1 pound.

In the same proportion, therefore, as the number of revolutions or the velocity of motion of the wheel increases, the power of rotation decreases. It is simply a confirmation of the above law, "what is gained in power is lost in velocity," and *vice versa*. Suppose the wheel *C* is securely fastened upon one arbor with the pinion *B*, of course, it must rotate upon its axis with the same force. This wheel *C* can in turn drive another pinion together with a wheel, both fastened upon the same arbor, and thus any number of pinions and wheels may be connected; and the law, however, ever remains the same, the greater the number of revolutions, the smaller becomes the power.

THE TOOTHING.

If a pinion is to be driven by a wheel firmly and securely, without gliding, both must be toothed. Each wheel tooth is intended to propel a pinion leaf, and the wheel must have as many times more teeth as the number of revolutions the pinion is intended to make, during one revolution of the wheel. We have seen that the number of rotations is dependent from the length of the diameter, thus, that a fourfold rotation of the pinion always presupposes a diameter of the wheel four times as large; we may deduce herefrom that

"The number of the wheel teeth and pinion leaves is proportioned in corresponding rate with their diameters," or the reverse.

"The diameters of wheel and pinion are proportioned to each other as are the number of teeth and leaves."

Thus, the calculation of a wheelwork may be based as well upon the number of teeth and leaves, as upon the diameters of wheel and pinion; the result of either one of the two calculations will be correct.

THE DEPTHING.

A wheel *A* and a pinion *B* are represented in Fig. 4, whose several circumferences and diameters stand proportional to each other as 4 : 1, and upon this was based the calculation of their power, exertion and revolution, their actual circumferences and diameters were not meant by this, however. It will have occurred to you already that the teeth could not lock into each other, if only the outer circumferences of wheel and pinion were to touch. The circles in Fig. 4 are called pitch circles, their diameters pitch diameters; the first ones are only suppositions, and show the line where the straight side surface, the flanks of the teeth of both wheel and pinion stop. From this line forward the teeth are rounded, consequently extend beyond the pitch circle with the rounded part of their teeth. It is not difficult to prove that the part of the wheel tooth lying beyond this pitch circle must be round and not square. A law of the lever requires that where by a depthing of wheel and pinion the transmission of power is intended to be uniform, the velocity of the pitch circumference as well as the lever proportions must remain uniform. That this cannot take place by a

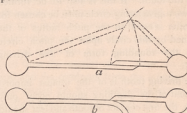


FIG. 5.

straight line elongation of the wheel tooth beyond the pitch circle, may be seen in Fig. 5, *a*. You will be able to judge that by a progressive motion of the two levers up to the dotted lines, the operating lever lengths gradually but continuously stand in different proportions to each other. Fig. 5, *b*, on the other hand, shows that the condition of affairs becomes far more favorable in a lever with a curved end. Be it understood, however, that not every convenient curve of the lever is the true form, as long as it is not straight. As little suitable is any convenient rounding of the driving tooth, to secure the equable motion of two interlocking wheels. Or is it a matter of unconcern what form the driven tooth, generally the pinion leaf, may have within the pitch circle, because the rounding of the driving tooth is intended to operate upon that surface.

Let us suppose the case that a pinion shall be driven by a wheel; it is a question of great importance what form the rounding of the tooth and the flank of the pinion shall have, in order to secure a co-operation of both flanks, an equable propulsion of wheel and pinion, and consequently, an equal transmission of power. Because, if by a faulty form of the operating surfaces, the circumference velocity of the wheel were for an instant only retarded or accelerated, the power transmitted to the pinion would be hastened or slowed accordingly. What, therefore, is the correct form for the operating surfaces? This problem has been solved in an extremely ingenious manner.

When a circle rolls upon a straight or circular line without gliding, a given point on its circumference will describe a peculiar curve, called the rolling line, and the circle producing this line is called the

generating circle. When this circle rolls upon a straight line, the rolling line produced is called cycloid; when rolling upon a circular line, the rolling line thus produced is called the outer rolling line, or epicycloid; when rolling within a circle, the line produced is called the inner rolling line, or hypocycloid.

These peculiar lines are used for the production of a mathematically correct dephthing. A dephthing would be perfect if the pitch circles of the wheel and pinion were to propel each other without sliding, which, however, is not possible without an additional toothing of both parts. Let us next suppose a generating circle to roll upon the pitch circle of the wheel and within that of the pinion, the rolling lines thus obtained, because produced by the same generating circle, must necessarily give the mutual points of contact, which during a dephthing operate together and best secure a continuously uniform motion of both parts. Experience has fully shown the epicycloid to be the correct rounding form of the driving tooth, and the hypocycloid produced by the same agent, the correct form of the leaf flank.

It is clear that the generating circle must be smaller than the pinion pitch circle, because the former has to move within the latter. The size of a generating circle would actually be of no importance, if other causes did not combine and confine it within certain limits, mostly with regard to the practical construction. The execution of so peculiar a form of flank would necessarily meet with many difficulties, if man's ingenuity had not sought and happily found an escape from these intricacies. This consists in making the diameter of the generating circle equal to the pitch radius of the pinion. The thus produced hypocycloid forms a straight line which concurs exactly with the pinion radius, and offers less difficulties in its practical execution than a curve formed according to rigid rules.

Let us suppose a reverse case, and say a wheel is intended to be driven by a pinion; although the general features of the pitch diameters are subject to the same law, yet the governing tooth rounding, the main features, must in this case be given to the leaf, because this is intended to operate upon the tooth. If this is also to be formed in accordance with the radius, a generating circle must be chosen for such a dephthing whose diameter is equal to the pitch radius of the wheel. The epicycloid formed by this circle upon the pitch circle of the pinion, represents the rounding form of the driving leaves.*

The rounding form of the driving tooth is of the utmost importance, because each engagement of the dephthing should occur only upon the center line; that is, the first contact of tooth and leaf should take place upon a straight line imaginarily drawn through the centers of wheel and pinion. The driving of the tooth before the center line is connected with a hard jumping, a so-called entering friction, while an easier one, taking place at the time of contact and during driving, behind the center line, is called the escaping friction.

The engagement of tooth and leaf, however, most favorable under all circumstances, because without friction, takes place upon the center line; the farther removed from this toward either one side or the other, the greater becomes the friction, which naturally produces a loss of power, and the contact before the center line is especially hurtful, owing to the entering friction. When the driving commences with the contact on the center line, only the flanks of tooth and leaf are brought into operation.

The number of pinion leaves, again, is a matter of great importance. When, for example, a wheel drives a 12-leaf pinion, each one of these leaves requires to be driven the one-twelfth of the pinion circumference, consequently, equal to an angle of 30 degrees; when an 8-leaf, this angle is equal to one-eighth of the periphery, or 45

degrees. The less the number of leaves, the farther the driving from the center line onward takes place, and, under circumstances, this contact must occur a little before the center line, to avoid an over-reach onward.

The difficulties of an easy dephthing, it is clear, are increased with the decrease of the number of leaves; and no dephthing can be constructed with less than six.

A pinion with many leaves will always give a good dephthing, and work with most ease and correctness; the number, however, is contracted by the consequent delicacy of toothing, and the necessity to preserve a certain size and strength, for tooth and leaf, as well as other considerations.

We next occupy ourselves with the question for the production of

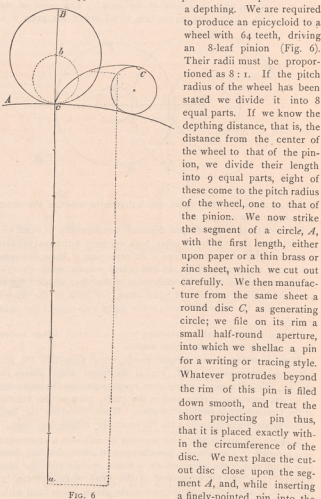


FIG. 6

small hole, roll it with an easy pressure to and fro upon the sheet segment. The line described by the fastened pin is the desired epicycloid. It is necessary, when doing this, to roughen the rims of the circles somewhat, (best done by pressing upon a new file), to prevent a possible sliding. We finish by drawing the center line where the rolling line touches the pitch circle, *A*. Also the pitch circle of the pinion has been given, for ease of clearness.

To use the thus obtained epicycloid for the sketching of the dephthing; we cut out of sheet tin, with care and exactness, the rolling line, together with the wheel radius falling upon the center line, repeatedly placing it upon either, as is indicated by the dotted lines. A straight side of the obtained metal strip is connected at *C* with the rolling line, whose length to *a* is exactly the pitch radius of the wheel.

(To be continued.)

*NOTE.—It is barely necessary to mention that this theory is applicable to toothings other than fits. For example, the rolling line produced upon a straight line, the cycloid, represents the rounding form of crown wheels and rack and pinion jacks, when intended to drive a pinion.

Alloying and Coloring Gold.

BY G. H. GEE.

From the Goldsmith's Handbook.

CONTINUED FROM PAGE 106.

An alloy of *pale yellow color* may be made by a small addition of iron to pure gold, say in the proportion of 1-12th of iron to 21-12ths of gold, forming 22 karat gold. The formula constituting one ounce of the mixture would be as follows:—gold, fine, 18 dwts. 8 grs.; iron charcoal, 1 dwt. 16 grs.

Iron becomes readily oxidized in contact with the air, therefore it is of the greatest importance that a good protective coating should always be secured for the surface of the fused mass in the crucible.

Another alloy employed in jewelry is to be found occasionally alloyed with iron. It is called *grey gold*. It has a greyish yellow appearance, and is used for leaves and other ornaments. The following is the 20 karat formula:—gold, fine, 12 dwts. 15 grs.; iron charcoal, 3 dwts. 8 grs.

This alloy is subjected to the same treatment applied to the others named, the details of which having been given when describing them, it will be unnecessary for a further comprehensive description here.

Formerly the bath employed for imparting the color of fine gold to jewelry consisted chiefly of the following ingredients: an alkaline nitrate, such as a nitrate of potash or soda and common salt, to which was added some acid sulphate, like alum, or ferric oxide, in order to produce a dilute *agua regia*. Dr. Wagner, a German, attempted to substitute the latter instead of the former, but without success. He is stated, however, to have accomplished his object by using a solution composed as follows: Bromine, 1 gramme; calcic bromide, 25 grammes; water, 1 litre.

Sometimes in place of the calcic bromide he used 30 grammes of potassic bromide. The articles are reported to be left in the solution from three to five minutes, then removed and rinsed in the usual way with clean water, and afterwards drawn through a solution of sodic hyposulphite. This recipe is said to accomplish all the purposes which it was intended it should do. Now, our experience has been different, and we unhesitatingly say no such successful results can be achieved by its employment as those stated. No; not even with the best quality of gold jewelers employ in their businesses. We have submitted all the higher qualities of gold to the action of the above mixture without achieving any good commercial success. 18-karat gold cannot be made to present a fine rich color when treated with it, not so fine, in fact, as it can with dilute sulphuric acid alone; in short, such recipes are not only utterly worthless and misleading to the trade, but they go through various scientific journals without the fraud being detected, and, consequently, eventually come to be looked upon as established facts. The mixture may be employed for the purpose of removing tarnish from newly-colored gold goods, which may have become tarnished in stock, but for any other purpose we cannot recommend its employment.

The following mixture is even better than the above for renovating tarnished goods; it can be used in the following proportions: Bicarbonate of soda, 2 oz.; chloride of lime, 1 oz.; common salt, 1 oz.; water 16 oz. Mix well together and apply with a soft brush. A very small quantity of solution is sufficient for effecting the desired purpose, and it may be used either cold or in a lukewarm state. Plain articles may be brightened equal to new by putting a spot or two of the liquid upon them from the stopper of the bottle, and lightly brushing over the surfaces with fine tissue paper until sufficiently dried off to accomplish the object intended.

In coloring by the French process without acid, some years ago, we substituted sulphuric acid for the alum, as formerly employed therein, and found it an advantage with some alloys of gold, when the quality was good. The process was rendered much quicker, and the surface of the work presented a much brighter appearance than when

alum was used. Any quality over 14 karats could be colored by it. This coloring solution was quick in its action, and if not employed too strong, was not so liable to rot the work as was the more extended process of alum coloring, for alum is a very penetrating salt, and often caused the work to appear overdone. The following were the proportions of ingredients we used when substituting sulphuric acid for alum: Saltpetre, 8 oz.; salt, 4 oz.; sulphuric acid, 1 oz.; water, 3 oz.

The sulphuric acid if added to the other chemicals when they had dissolved in the color-pot caused effervescence and escape of gas, which was not altogether agreeable and pleasant to the operator in charge of the process. To dispense with which, and render the process more readily accomplished, we mixed together the sulphuric acid and the water in their gelid state, then poured the mixture into the color-pot, and afterward added the salt in as fine a powder as was possible. Next, we placed the pot upon the fire and allowed the contents to boil. The work to be colored was then taken and put into the boiling mixture in bunches in the usual way, and allowed to remain therein, with gentle agitation, for *four minutes*, when it was withdrawn and well rinsed in boiling water. The color was then slightly thinned with hot water, and on its again boiling the work was again put in for *two minutes*, and again well rinsed. At this stage the color required to be further thinned and boiled up, when the work was for the third time put in again for *one minute longer*, and, finally, rinsed as before. It was then ready for finishing by the scratch brush or burnisher, whichever preferred. Jewelers' work treated by this recipe in the manner described receives a fine and bright color if the quality is 14 karats and upwards. Seven minutes is the time in all the work should be in the color-pot, and the above quantity of solution will be sufficient to color 10 oz. of solid gold chain or rings and about 5 oz. of hollow work; but this will to a great extent depend upon the amount of surface, as all must be conveniently covered in the pot to produce an even and regular surface.

In precipitating gold in the waste waters of jewelers, care should be taken not to add too much of the precipitating salt—copperas—as if too much is added to a given bulk of solution it will cause the re-dissolving of the precipitating gold, which then passes off with the water as it is drawn away and is lost. Of late an unusual quantity of light hollow work has been made, that is, work drawn on iron wire, and before the work can be finished this iron wire has to be dissolved from the interior of it. Now, we have found in adding the liquid and the residuum from the process to the general waste waters, that it caused too much of the sulphate of iron to be added to properly effect the purpose intended, viz, the precipitation of the gold. The effect of this increased volume of sulphuric acid and the sulphate of oxide of iron combined, was the re-dissolving of the gold precipitate, causing it to be held in the solution as at first, and as the supernatant water was finally drawn off the sediment, it very naturally passed off with it. The truth of this assertion may readily be verified by taking a small quantity of the solution from the bulk and largely diluting it with water; when, on the addition to it of a few drops of a very pure solution of proto-sulphate of iron, it produces turbidness, the gold cannot have been effectually precipitated in the first instance; or on the other hand, the re-dissolution of the precipitate must have taken place as indicated. The best way to treat the spent liquid from the iron dissolving, which contains sulphuric acid not decomposed and sulphate of oxide of iron, is to keep a special receptacle formed of stoneware for receiving and preserving it; no hindrance or disadvantage will thereby accrue to the gold-worker in causing a departure from the usual waste-water treatment of his establishment, which otherwise would have to be, or a consequent loss of gold would be annually taking place.

It is not generally known in the gold-workers' trade that common washing soda quickly dissolves, in conjunction with hot water, the hard cake of sulphate of iron which forms in the dissolving vessel, when the liquid becomes saturated with it, which it does if attention be not constantly directed thereto. The plan adopted in some gold-

working establishments, where crystallization is found to have taken place, is to put into the vessel some water, and then place it upon the gas jet and heat it until the whole is completely dissolved again. This method takes a long time to do, and therefore causes a great waste of time, which may be utilized to a greater advantage. If the crystallized mass, after the remaining uncrystallized liquid is poured from the surface, be treated as follows, complete liquefaction will almost immediately take effect: Take about one ounce of the soda above named, either in powder or the lump will do for the purpose, and put it into the vessel to be operated upon, then add a small quantity of boiling water, when great effervescence will instantaneously commence; this may be increased, and dissolution of the intricately mass assisted by taking the pipkin—which is the best vessel that can be employed—with the right hand and briskly moving it in a circular direction, thus causing greater agitation of the liquid with increased action of the salt, and the breaking up of the refractory mass into the liquid state, at which stage it should be poured off, and a fresh addition of the sodic salt and boiling water should be made, when the crystallization of the iron salt is found to be hard and large in quantity, which will very often be found to be the case where there are unlimited proportions of iron to be dissolved, when the liquid employed for the latter purpose has been strong, and its removal from the pipkin has not been effected at the proper time.

A simple test for distinguishing steel tools from iron ones, which have the same polish and workmanship alike, as if all were steel, consists as follows, and when it is wanted to make the distinction quickly, place a spot of dilute nitric acid upon the tool, and if the tool remains pretty clear, or at the most only shows a whitish mark, then the characteristics named prove it to be iron; but if it shows a dark mark where touched by the acid it is steel. The acid testing solution may be of the strength of one acid to four of water. The marks can be rubbed off by repolishing the part affected.

A mild test for ascertaining the quality of some of the various alloys of gold is prepared in the manner here stated, and applied to a clean or filed part of the article to be tested: nitric acid, 8 drachms; water 4 drachms. Keep the preparation in a small glass phial with a long stopper dipping into the acid, which is most convenient for conveying the liquid from the phial to the work to be tested. This test will have no effect with the higher alloys of gold, like the one given in the earlier part of this work, but it is a more simple and ready test for the lower qualities causing very slight discoloration in alloys of 8 or 9 karats if properly alloyed. It will be found, therefore, more suitable for the general jeweler, when these qualities are brought under his special notice. The nitric acid employed should be of the greatest chemical purity.

A very useful gold color for ordinary work is composed of the undermentioned formula. There should be a fair amount of silver in the alloy composing the work, for producing a bright, smooth surface; nitrate of potash, 8 oz.; common salt, 4 oz.; muriatic acid, 4 oz. Take a black lead color-pot, large enough to prevent the color boiling over when it reaches that point, place it on the fire and make hot, then put in the powdered salts, stirring them all the time until fine and hot. The acid is then to be added, and the heat increased until the boiling point is attained. The work is next put in and alloyed to remain with gentle agitation for three minutes, when it is withdrawn and rinsed in boiling water, to which a spot or two of muriatic acid has been added. Now thin the color with 1 oz. of muriatic acid and 1 oz. of water, and boil it up again. Finally, put in the work for one minute longer, then well rinse as before in fresh hot water, scratch-brush and dry in sawdust, and the coloring is completed with capital effect, if properly manipulated from the commencement of the process. This solution will color 46s. gold and upwards with every satisfaction.

We have often tried to color gold in an entire liquid solution after the style of the electro gilding process, and ultimately hope to be commercially successful in the endeavor. In the meantime, how-

ever, we have succeeded with some alloys of gold in coloring with the following chemicals. The solution employed would be a dilute aqua regia, and it was the nearest approach to good gold coloring we could arrive at after some months of experimenting. The aqua regia was prepared on a much more dilute scale than that of the true aqua regia. It consisted as follows: Hydrochloric acid, chemically pure, 8 oz.; nitric acid, chemically pure, 1 oz. These were intimately well mixed and put into a stoppered bottle for use. When we desired to color, used to take 4 oz. of liquid arising from the old process of coloring, or from this when sufficient had accumulated, to 1 oz. of the above prepared mixture. The solution was then boiled and the work dipped in for a period of from one to three minutes, according to the depth of shade required upon the work. Nitrate of potash may be substituted for the nitric acid in preparing the above formula, and in coloring with some alloys we have found it an advantage. To 8 oz. of muriatic acid, 2 oz. of saltpetre would be required in making the aqua regia. The muriatic acid should be gently heated until the saltpetre is dissolved, then place aside to cool and afterwards bottle securely. When required for use in coloring, well shake the mixture in the bottle, and take of the same proportions as previously stated. Good recipe for good gold. Color deep.

Another coloring mixture we have found to answer in experimenting in that direction, viz: hydrochloric acid, 6 parts; nitric acid 1 part; chloride of ammonia, 1 part; bichloride of soda, 1 part; water, 1 part. This solution was used repeatedly as old color, and when it was desired to revive the strength of it a little, the same proportion of dilute aqua regia was added when coloring, as named in the previous recipe.

To dissolve copper from gold articles, take 2 oz. proto-sulphate of iron and dissolve it in half a pint of water, then add to it in powder 2 oz. nitrate of potash, boil the mixture for some time and afterwards pour it into a shallow vessel to cool and crystallize, then to every ounce of the crystallized salt add 8 oz. of muriatic acid, and preserve in a bottle for use. Two oz. of the above preparation should be mixed with 2 oz. of boiling water as the right proportion to use in dissolving copper, or 1 oz. of nitric acid may be used to 4 oz. of boiling water as a substitute.

Tarnished gold may be renovated and the oxide removed from new or soiled work by applying warm spirits of wine with a soft brush or flannel, when its brilliancy will be restored again.

High quality of gold articles, when their color has deteriorated, can be restored to their primitive beauty by the application of the following mixture: Sesquioxide of iron, 3 oz.; calcined borax, 2 oz.; chloride of ammonia, 1 oz.; water to form paste, 2 oz. Well mix the powdered ingredients together until a thick and even paste has been formed, then take the work and either dip it into the mixture or otherwise brush it over with it, care being taken to see that it is well covered with the color. The articles to be brightened are then taken and placed upon a copper pan, and heated over a clear fire until all hissing sound has ceased, and the articles have received a moderate amount of heat, when they are withdrawn, placed aside to cool, and afterwards boiled out in weak muriatic acid to dissolve the coloring salts adhering to the surface. Well rinsing, scratching and drying completes the process. This produces a fine and high color to rich gold if the alloy is of a deep hue. It may be used for restoring the color to repaired places of gold chains, which have had to be mended after the color has been given to them, and when it is not safe or economical to put them through the acid process again. After the soldering has been completed, take a little of the above composition prepared as above stated and apply it to the soldered parts, then heat the parts only very gently with the gas jet by means of the blow-mouth-pipe, allow to cool, then by dissolving the adhering flux by the means before stated, and slightly scratch-brushing the places that have been re-colored, rinsing and drying the work completely restores the evenness of surface.

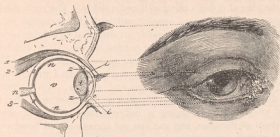
(To be continued.)

A Chapter on the Preservation of Health.

[Translated from *Abnancch-Annuaire des horloges*.]

THE CARE OF THE EYE—ITS INNER CONSTRUCTION.

THE body of the eye is formed of several layers, which, like hollow spheres, lie within each other; the accompanying cut gives both an outer and a sectional view.



The first of these layers, *s s*, which is called the white of the eye, or the sclerotic, is a hard, resisting, opaque, white skin, perforated posteriorly with a number of small holes, for the admission of fibres which unite and form the optic nerve. Only a small part of this envelope can be seen posteriorly. A transparent coat, *c c*, the cornea, is anteriorly sprung in like a watch crystal, into a bezel of the sclerotic; the iris, *i i*, is placed behind the coat, from whose color the different colors of the eye depend—black, blue, hazel, etc. It is perforated by a round hole at *p*, called the pupil, whose diameter changes with the varying quantities of light necessary for seeing. It expands in darkness, contracts in the rays of the sun.

The rays of light enter through the pupil into the crystalline body, or lens, which is enveloped in a transparent layer, and closely adheres in all parts of its circumference to the cornea.

The interval between the iris and the cornea, *p*, and the space behind the crystalline lens, to the fundus *n*, is filled with a watery fluid, the so-called aqueous humor. The fundus bottom of the sclerotic is lined with a thin, dark brown layer, called choroid, which serves the same purposes in the eye as the black coating does inside of optical instruments. In front of the choroid, without being connected with it, however, spreads out the retina, *n n*, a transparent layer, which is solely a development of the optical nerve, through which the impressions received by the retina are transmitted to the brain.

Our eye is simply a camera obscura; the picture of outward objects passes through the pupil and the crystalline lens, depicts itself upon the retina, where it is placed in bold proportions by the dark-colored choroid, and thence it is conveyed by the optical nerve to the brain. The crystalline humor performs an important part in vision; when its form is too round, short-sightedness ensues, which enables a person to recognize objects in his immediate neighborhood only; when too flat, the consequence is far-sightedness, producing at the same time debility of the optic nerve. An opacity of the crystalline humor is called a cataract; vision gradually grows dimmer, with increasing age, and ceases at last altogether. The flattening produced by age generally dulls the clearness of the objects perceived, while it permits the short-sighted to gradually dispense with his spectacles.

PRACTICAL HINTS.

Dr. Muston says: "The performance of the very minute pieces of work of the watchmaker, demand the use of the magnifier. Too frequent or too long continued a use is apt to produce inflammation of the conjunctiva, or cornea, but chiefly produces debility of vision." M. A. Chevalier, in his treatise, *Hygiene de la vue, par Arthur Chevalier, Paris*, also says that too long a use of the glass produces far-sightedness, and rush of blood to the eye; debilitation of sight is simply one of the lesser evils arising therefrom. "The use of magnifiers is followed by the same effects as that of unduly strong glasses." The watchmaker who desires to preserve sharp and distinct his vision, should observe the following rules: Apply the mag-

nifier only for a short period, by the contraction of the skin immediately surrounding the eye. The use of a frame or other contrivance which demands no extra muscular exertion of the eye is to be preferred. Bore three or four small holes through the rim near the lens, so that the air confined within it while being used, does not become overheated, but may pass out, and be replaced by cool air. (This also prevents, or at least lessens the sweating of the glass.) Use only good and really chromatic lenses. If circumstances force you to use the common article, insert within a lining of blackened paper, which caution, while contracting the visual field, at the same time lessens the evil consequent upon an over convexity of the glass. Finally, it must be borne in mind that late work, as it has to be done by artificial light, more especially the glaring gas light, dulls the vision in shorter time than the natural daylight. The watchmaker who is compelled to occupy himself with articles of minute dimensions, by artificial light, should repeatedly direct his eye upon some large object, for rest, and cool it occasionally with water.

How many there are of our colleagues, who, to-day deploring the effects of weakened vision or an incipient blindness, could, by following a few sensible hygienic rules, still enjoy intact their sight.

CL. SAUNIER.

To which Mr. Grossman adds the following sensible additional rules: Many a watchmaker has the evil practice, while at work, of smoking cigars or a short pipe, which must be regarded as very pernicious to the eyes, because by the inclined position of the head they are brought immediately over the point of combustion, and all the gases and emanations created thereby enter into them. It is another very reprehensible practice and anyone who values and wishes to preserve his sight, should never be guilty of, viz: to read or do a small piece of work in twilight, insufficient or flickering artificial light. It is equally injurious to work in the immediate sun rays, or under their influence, such as sunlight reflected from an opposite white building. Rays of artificial light must neither in dwelling rooms nor workshops directly enter the eye. The working lamp should be placed so deep the eye is placed within the shadow of the lamp shade. Lamps placed or suspended high should be provided with ground or milk glass globes. A former pernicious custom is falling into disuse at present—the use of metallic lamp shades, because they conducted all the accumulated heat directly to the head and eye. The watchmaker should treasure and ever be mindful of the motto of the celebrated Dr. Boerhave: "Feet warm and head cool."

So delicately composed an organ as the human eye must of necessity stand in harmony and sympathy with the disturbances of the entire body, and its qualities and effectiveness in the closest relationship with the prosperity thereof. A well-regulated mode of living, temperance in all things, good and adequate nourishment, avoidance of strong excitement, etc., will also be very beneficial to the eye. In case of injuries to the eye, medical assistance should at once be sought, and until arrival, inflammation is kept down by cold applications. When by accident a foreign body enters into the eye do not rub, because the friction only irritates and inflames the eye. Draw the eyelid as far away from the eye as possible, as such a body then lies upon it free of pressure, and tears begin to flow, often washing the body out; this operation may be assisted by quickly glancing from place to place. Such a body also can in most cases be removed by means of a strip of paper or a small camel's hair brush. Never permit anyone not a medical expert to touch your eye with a hard instrument. It occurs at times while turning that a piece of hot metallic splinter will fly into the eye and lodge so firmly as not to be removed by common means; it must be supposed that a point has entered the eye, and a skilful oculist or doctor should be sent for, who at the same time will prescribe the regimen to be followed. Such splinters, being sharp cornered, will embed themselves very tenaciously sometimes.

Health—The Bench and Seat of the Watchmaker.—Choose the height of the working bench and seat with care, and in such a manner that

the lower body be compressed as little as possible, or inclining the upper body too much. This may be done by making the seat a few inches higher than the knees, and the thighs will slope downward. The bench should be of such a height that when the occupant stretches out his arms, it is immediately under them. Do not use a vise whose jaws lay almost level with the bench; not alone is the screw very contracted in them, but the turning lathe fastened in such a contrivance is placed entirely too low, and the workman has to stoop too much. Do not use an upholstered seat; cane or perforated is preferable. Do not at once resume work after a meal; if possible, take a walk for half an hour; else procure gentle exercise of some sort.

I would recommend to anyone who is able to be his own master, to stand when at work, even while occupied on the most delicate object. In this matter I speak by experience, because I have worked in a standing position for the last thirty years, have no seat near me, or own one, and only sit down during the whole day when at my meals. Many acknowledge their inability, because they did not possess sufficient fortitude to conquer the consequent fatigue of the first few days. Others express the fear that the necessary calmness could not be obtained, requisite for fine work. This is an error; both the lower arms rest upon the bench while standing; and when turning, the left shoulder is braced securely against it, and the motions of the body are under perfect control. Again, when going to work or leaving it, the workman is sooner ready, or if something falls down, he is readier to pick it up than one who is seated. No one who has trained himself to standing has ever complained of the custom.

Heating and Ventilation.—The heating and airing of a closed room must stand in due proportion, and should take place continuously. The heating, so far as practicable, should be of a uniform rate; sudden extremes are to be avoided. The normal amount of vapor in the air should never be decreased by heating. Since metallic stoves are apt to do it, a vessel containing water should be placed upon them, to gradually evaporate. Ventilation serves the purpose of preserving the air of a closed room pure, and, consequently, it must, first remove the vitiated air, second admit fresh and pure air. It should take place night and day, and no bad odor from vitiated air be perceptible.

The amount of pure air per hour necessary for breathing, ranges from 6 to 21 cubic metres. The following is an example illustrating the importance of ventilation: The scrophulosis broke out in a school containing 600 scholars, at Norwood, and caused great devastation. The cause was ascribed to insufficient food. Dr. Arnott, who was charged with investigating the affair, found the food to be good and abundant, but at once saw the insufficiency of ventilation. Arrangements for a permanent admission of air were at once made, and the scrophulosis disappeared soon after. The same building at present shelters 1,200 children in a vigorous and thriving condition, which formerly contained 600 puny and scrophulous scholars.

Breguet Hair Springs.

HOW TO PUT THEM IN EXPEDITIOUSLY.

TIME is money, says the old adage, and in this day the workman who can do the most work is the man sought after by employers. This is all right if you only do your work well; and a rigid system of discipline, with practice, will learn you to do a job of any kind well and quickly. This is illustrated in our American watch factories in an astonishing manner. The grinder, as he is called, is the man who puts in the hair springs and brings them to time; but this is not all he does; he has to time and poise his balances, stake on his rollers, put in the banking screws, file off his regulator pins, bring his watch to time (within five seconds an hour, and the regulator in the middle), and do all this under a rigid system of inspection, for less than twenty cents apiece—this price is for the lower grades. And these watches are the best spring watches in the world, grade con-

sidered. I venture the opinion boldly, that take fifty so-called first-class journeymen watchmakers, who fancy they can put in a hair spring "as good as anybody," and let them sit down to the springer's bench in any of our first class watch factories, and if two of the number get a box (ten movements) passed by the inspector in a week, they will do well. I speak in the matter from experience; in slang phrase, "I've been there." I made mention of the above to illustrate the idea of doing a thing well and quickly. The tools used for springing are very few and simple, and with the exception of one special tool are used indiscriminately for either flat or Breguet springs; and be described along as they are needed for use. It is absolutely necessary either to have a Botton hair spring gauge or a modified and improved form of the same instrument of which I will give a cut in my next article. A box quite flat and shallow, with numerous small divisions, for keeping hair springs in, together with the few special tools used in springing is indispensable. This box should have about 48 divisions, and you can put springs of two numbers in each. Let each compartment be numbered so you can see at a glance the spring you need. A box of assorted balance screws is another necessity; these will mostly accumulate from *worcks* or such old movements as you condemn and dismember for use as material. When you buy a paper of hair springs, gauge them off into the compartments of your box according to number. A gauge should be divided into 100 degrees; the highest number should correspond to such a spring as would be needed for a Seth Thomas locomotive clock or a Burk time detector, and altogether too strong for any pocket watch. With such an arrangement it is only the work of an instant to select a spring; you gauge the old one and take one from your box which, when the extra length (supplementary coils) are removed, will correspond to the old one. Be very careful in gauging; it will save you lots of bother. Hair springs are made in close, medium and open coils, and are known as one, two and three coil springs; these terms come from the mode of manufacture. Springs when hardened and tempered are wound around a little hub or collet, with protecting cheek pieces; if two are wound together, they are called two coil springs, and the space between each coil is of course only equal to the thickness of the wire of which the spring is made. Three coil springs, three are wound together; four coil springs, four are wound together. A glance at Fig. 2 will explain the matter. For Breguet springs a three coil spring is generally selected, and of such strength that ten or twelve coils will bring the watch to time—as a rule say twelve coils. The *modus operandi* of springing is conducted as follows: place the collet of your old hair spring on a collecting tool. This tool is shown at Fig. 1. It is made of a piece of steel wire about one-tenth of an inch in diameter, and three and one-half inches long, turned flat at the top as shown, so as to fit the hole in any collet. This makes a convenient tool to hold a collet while you are pinning in the inner end of the hair spring; let the spring lie flat when it is pinned in, not cocked up as shown at dotted line *g*; force the pin in firmly, and be sure about it—great annoyance frequently comes from this neglect, as the inner end of the hair spring is actually loose. By revolving the collecting tool between the thumb and forefinger, the hair spring can be pretty well judged in regard to its truth in the flat and round. The truing of a hair spring in its flat and round is by far the most difficult part of the art of springing, and is done in this way: Pin in your spring so its starts free and clear of your collet, but not too far away; if it is a three coil spring let it be about the thickness of a wire from the collet. Two or three tools made and shaped like Fig. 1, except the end *r* is split as shown at *n*, (magnified); these tools, with different slits, can be used to bend and manipulate the inner end of the spring much better than the tweezers. All the bending



Fig. 1

FIG. 1

Fig. 3 a diagram of the theoretical spiral a spring should have. I have struck circles with the dividers; these circles are the same distance

apart as the coils; the first circle starts with the spring at v , consequently when the curve gets at x , it should be just half way to the next circle. I have divided the circles into eight parts to make grade more apparent, and you can see the spring gradually bend away from the inner circle, until at z again it is an entire space away. Of course, in practice it is impossible to strike circles and measure, but with the correct theory firmly impressed on the mind, you will soon learn to see if the conditions are complied with. After you have the spring as true, as can be judged on the colletting tool, put on the balance staff where it is to go, and be sure the collet is down firm to the balance, and not tipped up to one side. Put the staff into your double calipers and proceed as if you were about to true a balance; you will quite easily get the spring to run flat, but in doing so let all the bending be at v , or very near it. Truing in the round is determined by the eye; if when the balance and spring are revolving rapidly it is looked at from the top, the opening, if true, will seem to carry the eye (out or in, according to the direction in which it is revolved), with an easy and gliding sense, no shiver or tremble. Practice this truing with a common flat spring until you can do a good job. To test yourself take an American movement, remove the hair spring and collet, take a new collet and fit it to the staff, put in a new hair spring, and true it in the flat and round; and now if you have another movement of the same kind see if your job is just as good in every respect; if you see any defects remedy them. It does not matter about bringing the watch to time, (the object is practice in truing the hair spring) as you will put back the original spring when through experimenting. I have dwelt at some length on the flat spring, and have done so because the greatest art in springing lies in the truing when it is a flat spring, for after it is true in this condition two minutes serves to make all the bends to convert it into a Breguet. After you have your springs true in the round and in the flat comes the timing; to do this expeditiously you must learn to count vibrations; most watchmakers can do this, but for the sake of those who cannot I will describe the method. With a strong pair of tweezers, clasp this spring at the point where you would suppose it would have to be pinned into the hair spring stud; let the lower pivot of the balance staff rest on some hard, smooth object—a watch dial is good; now with some delicate instrument set the balance in motion and try and count the vibrations; if it only swings in short arcs it will do.



slow, take up a little. You will need to be quite accurate in counting, for with Breguet springs there is no taking up or letting out of a hair spring to exceed a very few minutes a day. In ordinary jobs it is not worth while to pay any attention to the points of attachment, whether they are on a radial line or not. Get an approximate time point, say within twenty minutes a day, then when your spring is in, bring your watch to time with the balance screws, either by changing or taking out or putting in a pair (always make screw changes by pairs, so as to preserve the poise of the balance); for the number of screws in a balance has nothing to do with the correct performance of the watch. But of course this is to be done within a limit; never let a watch go out with less than 12 or more than 16 screws; and never file off the screw heads, especially obliquely on the lower side, but effect your object by changing screws, i, e , if your watch runs

fast take out a light pair and put in heavier ones; if too slow, take out the heavy ones and put in light ones. The position of a screw in the rim of a balance, whether near the arm or not, has no effect except in the heat and cold adjustment. You will see that this system of bringing a watch to time by changing screws makes the box of assorted balance screws I mentioned above very necessary. This system does away any taking up or letting out of a Breguet spring; but don't let your balance get out of poise by these changes.

The Time of Day in Paris.

THE importance of precise and uniform time throughout Paris becoming ever and continually more appreciated, the Municipality have taken the matter in hand, and have established a system of what they call "horary centers." These horary centers really consist of standard clocks, erected in different places, and controlled by electricity from the Paris Observatory. Moreover each standard clock is furnished with additional electrical work of its own, which enables it to send out an hourly current and control other clocks in its neighborhood, placed in circuit with it. The advantage of this arrangement over any system of electrical dials is apparent, for the wires would cause the whole city to be misled or deprived of its time. The problem, as put by Leverrier, and as it has been practically solved by M. Breguet, was this:—To keep correct the hour given by various regulators distributed in the city by means of an electric current sent from the observatory. If the current, in consequence of any accident, fails, the regulators continue to work, with a very slight advance, without the electric correction. The wires have their center at the Observatory, where there is an astronomical regulator on the first floor. The instrument is maintained at the exact time indicated by the astronomical observations, by means of an arrangement which obviates the stopping of the pendulum and changing its length. At the bottom of Fig. 1 is a box C, in which may be placed small weights. The weights are of such shape that it is easy with suitable pincers to put them in or take them out without disturbing anything. The addition of a weight makes the regulator go faster; its withdrawal retards it. At the upper part of the pendulum is seen the apparatus by which the currents are admitted; it is in duplicate, because the pendulum beats seconds, and it is desired to send the current every second. Each apparatus is composed of three identical pieces; three small levers are placed side by side, pivoted at their farthest ends. Their end i is raised by the arm v carried by the pendulum at each of its oscillations. During all the time which this contact lasts, the current of a battery passes by the suspension of the pendulum to the arm which carries the three screws and the three levers which conduct it to the line. With a single lever there would

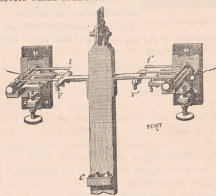


FIG. 1.—REGULATOR OF PARIS OBSERVATORY.

be danger of interruptions by a grain of dust; with three, contact and transmission of the current are absolutely assured. From the Observatory two wires set out; no use is made of the return earth-current. The wires are entirely in the drains, like those of the Telephone Company. There are only two circuits, each of which is attached to the Observatory by its two extremities. Their lines pass by a series of points and traverse the regulators, of which we shall now speak, and which are called horary centers. The pendulum of each regulator (Fig. 2) presents at its lower part a piece of soft iron, in which

the oscillations of the pendulum is brought in front of the poles of two electro-magnets in succession. The transmission of the current into these electro-magnets tends to retard a little the movements of the pendulum, and causes each to be perfectly synchronous with that of the Observatory. The regulators of the horary centers show the second; they are placed in the street, and consequently in view of the passers-by, who may thus compare their watches. Watchmakers may also thus obtain the exact time without making a journey to the Observatory. They are placed in several prominent buildings in various convenient centers.

Why these regulators are called horary centers is explained thus: upon the circuit of horary centers spoken of above, is grafted another accessory, called the transmission of the hour. Each regulator of the main circuit is itself the center of a less extensive network of wires, which transmit the hour to the public clocks. For this second service no unique system has been adopted, and uniformity has not been aimed at. Several of the principal watchmakers of Paris, inventors each of a special method of transmitting the hour, are authorized to apply it to the clocks of which they have the care, by borrowing the hour and the current from the nearest horary center. The most interesting horary center is that installed at the Hotel de Ville (at present the Tuileries), and which radiates to the twenty *mairies*

of Paris. The city has a telegraphic communication which places the Prefecture of the Seine in connection with the twenty *mairies*. The wires of this system are interrupted about two minutes every hour to place the clock of each *mairie* into agreement with the regulator (horary center) of the Hotel de Ville as follows. Beside the regulator are placed twenty relays, into which it sends every hour a current, which cuts off the line from the telegraph; this communication is made 100 seconds before the hour. The same regulator, about twelve seconds before the hour, sends the current along the lines; it interrupts it at the hour precisely. Ten seconds after the hour the relays are restored to their normal position by the suppression of the first current; that is to say, the lines are restored to the telegraph.

On the other hand sixty-five seconds before the hour each *mairie* clock makes its commutation, *i. e.*, cuts off the line from the telegraph and connects it with the electro-magnet of the clock. And five seconds after the hour it makes the inverse commutation and restores the line to the telegraph five seconds before the resumption of the line by the telegraph at the horary center of the Tuileries. As the clocks are thus regulated every hour their errors are extremely small. If, however, a clock gets suddenly out of order or stops, what happens? The current of the horary center is sent into the telegraph of the *mairie* for thirty seconds continuously; this abnormal fact announces at once that the clock is out of order, and he may give orders to have it set right.

In the other horary centers the organization is less complicated; it is provided for only six lines, but on each of these may be placed several clocks. The lines are shorter, and radiate only in the quarter which surrounds the horary center; but they are special to the

service of clocks, and are not subject to the complicated operation which is necessary on the circuit of the *mairies*. This service has been organized under the direction of the City Engineers, and does them the highest credit; no doubt it will be gradually developed, so as to include the whole of the *mairies* of Paris.—*La Nature*.

General Principles of Escapements.

DISCOURSE DELIVERED BY BERNHARD ZACHARIA BEFORE THE POLYTECHNIC SOCIETY, LEIPSIG.

THE common interest with which horology is regarded, and its bearings upon commerce, etc., may be and is condensed into two questions laid before the watchmaker almost daily: "what is the difference between an anchor, a cylinder, or a verge watch?" and "how is it possible that two watches similar in appearance, of apparently the same kind, and serving the same ends, should yet be so different in price?" I have made it my task to answer these questions to-day. Before proceeding to an explanation, I wish to preface my remarks with a few words.

A clock is simply a calculating machine. All hanging or standing clocks, regulators, or whatever their names may be, serving the purpose of measuring time, simply record their pendulum oscillations. A clock with pendulum so long as to consume one second in its motion, records 3,600 oscillations per hour. Beside counting, the clock is charged with another function.

It is well known that pendulum oscillations are subject to the same law of falling bodies, and controlled by the force of gravity. This force, being ever constant, should, as might be supposed, cause an ever continued motion. But resistance of air and friction combine and insensibly decrease each swing, until they vanish it altogether, and force the pendulum to stand still within a few hours. It is the additional duty of the clockwork to restore to the pendulum so much power as has been consumed in conquering the said resistance of air and friction.

The pendulum is the most simple, secure, and at the same time only correct means with which to measure time. As a matter of course, it can only be used in stationary clockwork. That exposed to changes of position and motions, without interfering with its rate, must be provided with a substitute for the pendulum; this is offered by the balance wheel. This of itself is not sufficient, however, because a balance wheel, having its proportions of weight evenly distributed—a condition requisite for watches—will not, when set in motion, make a vibrating, but a swinging motion. Rotation is useless to us; we must have oscillation, vibration, and this is produced by an object which stands in the same relation to the wheel as the force of gravity stands to the pendulum. This important office is performed by the application of a very simple means, the balance spring. This is a spirally wound steel spring, with its inner end fastened to the arbor of the balance, its outer end to a fixed point. When the wheel is driven to one side, the spring's elasticity is brought into play, and it produces motions analogous to those of the pendulum. This motion, also, would be continuous, if its old enemies, resistance of air and friction did not strive against it, far more intensified than by the pendulum, and very soon force it to stand still.

I deemed these introductory remarks necessary, and now engage with the question, "What is the difference between an anchor, a cylinder, or a verge watch?" The denominations are derived from the different mechanisms charged with the function of maintaining the balance vibrations, and at the same time to prevent the wheelwork from running down, that with each vibration it may only progress to an insignificant amount. These little appliances are called escapements. This short explanation will sufficiently show that the correct rate of a watch altogether depends upon the equality of the balance vibrations, and it is a known fact that the greatest care must be bestowed upon the escapement, and in its execution, if a true going watch is the ultimatum.

There are many different kinds of escapements, which may be grouped into three general heads, each one of which has several sub-

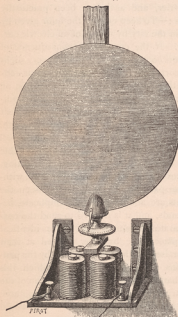


Fig. 2—REGULATOR OF THE HORARY CENTER.

divisions. The former are called the recoil, the dead beat, and the free escapement. The oldest of all, consequently the most imperfect, is the recoil, in use ever since the construction of wheelwork, up to the present day. It is called the recoil because its balance, while accomplishing its vibration, after a received impulse, drives back the entire wheelwork by one-fourth or one-fifth. This may be observed on the crown wheel of any verge watch. This peculiarity alone testifies to the imperfections of the verge escapement, in spite of all the affections of the public. As it may be considered out of date and market by having been crowded out by newer and better sorts, I deem an elaborate description of its escapement unnecessary; and content myself with merely pointing out a few of its defects.

First, the friction upon its pivot holes and depths is four or five times as great as necessary, consequently the wear of these parts is important. The most injurious effect lies in the fact that its balance vibrations are influenced to a high degree by every defect contained in the movement. When one of these errors has been vanquished by the motive power, which struggle may last from a few seconds to six, eight, even ten minutes, owing to its seat, the balance wheel will not receive its required amount of impulse, it vibrates with less energy, and it is compelled to overcome in its recoil once more the entire fault in its weakened condition. Anyone who wears or has an old verge watch under observation, will have noticed, especially in bad ones, a significant difference in its vibrations. Apart from these mentioned defects, the verge possesses others which unfit it for the employment in watches.

There is only one known way of counteracting the irregular motions to which a watch is exposed in the pocket, and of making them less sensible, which is done by means of a weighty balance, and to cause it to make vibrations as large and as rapid as possible. A verge does not admit the use of any or all these remedies. It only goes with a light balance, permits but one-half vibrations, and makes at most 17,000, while 18,000 beats have shown themselves to be best adapted.

Far more perfect is the dead beat escapement, also called reposing, because the wheelwork, while the balance after an imparted impulse performs its function, stands without motion. Consequently none of the defects mentioned of the recoil are present in this; such a movement even compensates within certain limits the effects of any errors contained in the work, and renders them of no disturbing influence upon the vibrations, as I will state further on. Herein is contained the reason why cylinder watches, whose escapement may be called the most important subdivision of the dead beat class, give such universal satisfaction, and are of great importance in every-day use. They have crowded out the verge watches, but will never be exposed to share a like fate. They will be in use for all time to come. They may be recommended to the poor man in need of a watch in preference to any others, owing to their simplicity and power of compensating defects. No risk is run, even when buying a cheap one, of purchasing a useless article, a risk sometimes run with anchor watches; and the average cylinder gives very satisfactory services for every-day's use.

It receives its name from an attachment to the balance, on which the impulse is given. It is a small tube cut out in one place to nearly one-half, only 220° remaining of its circumference. Below this is a second smaller cut, to the amount of one-fourth of its circumference. The bore is closed with plugs of tempered steel provided with pivots, which revolve with very little friction in their holes; the balance is placed above this and the spring surmounts all.

The last wheel of the escapement, the horizontal wheel, is of peculiar shape and construction. Its teeth may be likened to wedges standing upon little pillars, with points inclined in the direction of the wheel. One of these wedges is constantly placed against the cylinder wall, either on the outer or inner; it pushes itself with the motion of the balance under the edge of the cylinder, and imparts sufficient impulse to the balance to speed it forward about one-half of its motion. The tooth which was thus operating now places itself

against the cylinder's inner wall, until the return motion of the balance, when it comes out again and imparts a new impulse to the cylinder.

I said that the reposing cylinder escapement compensates defects in the work within a certain limit, and I reiterate it, in order not to be misunderstood, producing proofs for any assertion. During the vibration a wheeltooth lies constantly against the cylinder, and occasions a friction proportionate to the power with which it presses against it. Now, if the motive power is reduced while overcoming a defect, the balance, of course, will receive less impulse, but the wheeltooth will press with so much less force on the cylinder wall, the friction becomes proportionately less, and the vibration will show no noticeable deviation.

The most perfect of all is the free escapement. It is called free, because its balance vibrates freely, without any connection with the wheelwork. The subdivision mostly in use is the anchor escapement which is far more complicated than any of the preceding. It consists of a balance, a scape wheel, an anchor with fork and guard pin, a table roller fastened to the balance, and the ruby pin. As long as the balance vibrates after a received impulse, free and independent of any occurrence in the wheelwork, the wheel lies within its teeth upon repose. At the return motion of the balance the ruby pin enters into the fork, raises the anchor to a small amount, whereby it causes the wheel to pass from a state of repose to one of motion (an inclined plane), the anchor is driven to one side by the power of the wheel, whereby the fork places itself against the ruby pin, and this imparts the impulse of motion to the balance. This escapement complies with all the conditions necessary to nullify the irregular motions of the body, and to make them insensible to the balance vibrations. It may vibrate nearly two circumstances, it inertia is very large.

Thus I have dealt with the first question as to the escapements, for which the watches are called. The second one, with regard to quality, can only be lightly treated by me; I had not the necessary time to collect the different specimens of the various parts of watches, as well as their qualities, and to place them side by side for comparison, so that even a layman might be able to distinguish the good from the bad, and I must confine my remarks simply to enumerate the difference between so-called dear and cheap, or better said, between valuable and worthless watches, and to state the tremendous difference between them. Defects in the anchor escapement will be found even in valuable watches, and it consequently is no cause of astonishment when they are found *en masse* in so-called cheap constructions. If simply the common defects are counted, about ten might be mentioned, each one of which will cause abnormal vibrations. They are sometimes all found together, and the motion then may rather be compared to a shaking than a swinging. The anchor watch with small vibrations is of no account.

In addition to faults in the escapement in cheap, ordinary watches comes a number of defects in the work. To specify a few. Incorrect form of wheel teeth and pinions and their inequality, long and short teeth, wheels not circular, pivots too thick and which move with great friction in badly polished or defective jewel holes; the different parts are made of bad material; steel parts, which should be hardened, left soft, consequently cannot resist wear and tear; much time and trouble may be saved by omitting the tempering of the steel parts; the watch, therefore, can be produced cheap, sold cheap, and leave a margin at the same time.

It is easily understood that a workman who is expected to furnish so complicated, artistic and delicate a mechanism as a watch, at a cheap price, cannot bestow the necessary care upon each one of its parts, of which there are about sixty. False proportions often occur in such concerns, which are of great importance. The engaging wheels and teeth must stand in well-defined proportions to each other. If the pinions are too small, the driving will be a dead movement in the depths, promotive of unequal driving power and quick consumption of parts. If too large, no easy deepening is possible, the teeth cramp and pinch each other. Many a watchmaker makes use

of the last plank and remedy left, and puts in a strong mainspring, thus forcing the watch to do possible service for a few years. Even faulty escapements may be forced by strong springs to make large, but unsteady vibrations; this has its dangers however. The stronger the spring, the greater the inclination to break, the greater the tendency to incidental injuries, which are connected with the breaking. Teeth may be broken out, or bent, etc.

If such a strong spring holds out, it may be that the watch goes for four or five years to the satisfaction of its owner; and to preserve his pet intact he hands it to the watchmaker with the solemn injunction to do nothing else with it than to simply lubricate the parts, as he is fully satisfied of its excellency in other respects. The watchmaker obeys the mandate with great scrupulosity, and does nothing else than to remove the dust and thickened oil, but must dismember it for this purpose; when it is put together again, with great care, the period of service for the watch has suddenly come to a close. This appears inexplicable to the layman, but easy of solution, nevertheless. By the continued cramping and wedging of the teeth, impressions, regular steps, have been cut into each other, which, so long as the same teeth and leaves operated together, managed to pass through, without much subsequent disturbance. When taken to pieces and put together again, other surfaces for mutual engagement will of necessity be presented, and the steps and impressions are of no avail. The watch refuses to go.

An important function is performed by the case. Among ten cases of cheap construction, barely one will be found passably free of defects; a faulty case opens gate and door for the admission of dust, and with the necessary daily openings soon becomes lame. Case making is a complicated art, and when one has issued from the hand of the maker, it is barely ever-remediable. Everyone should be warned against the cheap gold watches, because a saving in the metal is of great importance to the manufacturer of bogus wares. The art of case making is often seen in these production to highest perfection. To the greatest possible saving is united an exquisite workmanship, but the case, owing to its extreme lightness, will shortly be indented and become useless.

Enamels.

[Translated for the JEWELERS' CIRCULAR from *Vollständiger Unterricht für Gold und Silber Arbeiter*, Hugo Börs, *Gold Arbeiter und Chemist*.]

VENICE for a long time enjoyed the reputation of preparing the only enamels; after many trials, however, the French, and subsequently the English succeeded in manufacturing them fully equal to those of Venice, and even superior in many respects. They fused with so much difficulty as barely to be suitable for 22 and 24 karat gold, while the French enamels ran freely upon 14, even upon 12-karat gold. Germany has lately entered the lists of competition and has succeeded well in its endeavors. Much enameling is done at Vienna, with Venetian enamel, however, to which flux is added. The following recipes for the different colors have been tried by me, and I have uniformly obtained good results from them. It is not my intention to vaunt them as the very best, but I always endeavored to obtain enamels equal to those from Paris. I have neither spared time nor expense to improve the mixtures, and I flatter myself that they, whenever put to practical test, uniformly gave entire satisfaction. However, I would advise no jeweler to prepare his enamels himself, because they cost a great deal more, as the preliminary and apparatus are very costly, and the greatest possible cleanliness must be observed. A special room is necessary in which the ingredients are prepared, and a special furnace must be made use of for the melting. The enamels cannot be prepared in small quantities, owing to the great loss accompanying the several meltings. If the expenses and loss of time are taken into account, the jeweler will easily see that only then any advantage will accrue to him, when he prepares larger quantities at one time.

As will be seen, the enamel is of a glassy nature whose base is composed of silice, oxide of tin and lead. The different colors are im-

parted by the usual metal oxides mixed with it. The basis of all enamels is called frit, and is composed of 5 parts silicious sand, 10 parts stannate of lead (plumbum stannicum), and 4 parts potash. This stannate of lead may be prepared by melting 3 parts English tin and 10 parts lead in open air; an oxide layer will soon form upon the mass, which must be removed as soon as formed, and pushed aside to allow a free entrance for the air. The oxide so obtained is powdered, and washed with water several times, if it should contain metallic grains, they should be melted and oxidized. The sand is seldom pure, and often mixed with other ingredients, wherefore it is advisable to clean it. Calcine it with one-fourth of its weight of common salt. The half-vitrous mass may be used as a component of the frit. Washing the sediment with diluted muriatic acid serves the same purpose.

A noted frit is prepared as follows: $\frac{2}{3}$ parts rock crystal; $\frac{1}{2}$ oxide of tin; $\frac{1}{2}$ bixide of arsenic; $\frac{1}{2}$ borax. The fusibility of the enamel must increase with the grade of gold, and the fluxes be enlarged, which, in the first recipe is potash, in the second, borax. The specified ingredients are powdered and put into a well-burned Hessian crucible. An accidental tint of the molten matter may be removed by adding manganese ore; a fixed amount cannot be given, as the mass is often colored more or less; repeated trials must be made with small quantities, and when the necessary amount has been determined, the main part should be melted with the corresponding amount of ore. The operation of melting must always be made in a well-drawing air furnace. Many use wood as a combustible; I have found, however, that it is very unsuitable, as the least quantity of smoke may ruin the enamel. Well-dried beech coal will be found best.

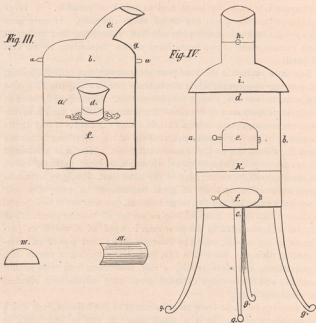


Fig. 3 represents the smelting furnace, such as I have found best adapted; *a* is the grate where the crucible *d* stands in a socket upon it; *c* is the ash receiver and at the same time the draft hole, to facilitate the supply of fresh coal around the crucible. When the furnace requires to be filled with coal, remove the chimney throat *b*, together with the smoke stack *e*, to which are fastened two handles *a a*. At *g* is a little door to observe the melting of the mass. When this is thoroughly fused in the crucible, cast it into the water, pulverize it, re-melt, again cast into water, and continue to do this three or four times, in order to obtain a thorough mixing of the ingredients. Lastly smelt, and either cast it upon a stone surface or in clay forms, and it is ready for use.

The enamel obtained is not alone used for the preparation of col-

ored enamels, but also to give a coating to those which have lost their lustre when immersed in the gold color, that is, it must be coated with this colorless enamel, when the colored has been burned in. Thus an additional fiery appearance is given it.

The following is another recipe for a colorless, quickly fusible enamel: 8 parts borax; 4 parts antimony oxide; 2 parts saltpetre, 12 parts white glass. The ingredients are powdered and melted in the indicated manner. The frit is the basis of all transparent, and the white the basis of all opaque enamels.

Oxide of tin is the coloring substance of white enamels; ultramarine or cobalt oxide is used for the blue, but care should be taken when adding the latter, because its coloring propensities are very strong; very little should be taken for a light blue. Verdigris or chromium oxide produces green. A very beautiful red color is obtained by the use of gold-purple, also called purple, or powder of Cassius; sulphate of copper (blue vitriol) and iron oxide also yield a nice red color. Antimoriote of potash gives a yellow, to which a little borax and iron oxide is added. Manganese ore, also called black lead and pyrolusite, in a small quantity, produces violet, in a greater quantity, black. Every tint described may be obtained by mixing these colors.

White opaque enamels: 4 parts stannate of lead; 4 parts crystal glass; 1 part potash. To be powdered and melted several times. The last two ingredients are first melted, the first is then added. Cast upon a stone surface or into an iron mortar, which must be warm. Another good white enamel is composed of 5 parts feldspar; 3 parts salt; 2½ parts saltpetre; 1 part tin oxide; 1 part magnesite alba. The feldspar is strongly heated red, then suddenly plunged into boiling water, whereby it becomes brittle, and it may be powdered more easily; the remaining ingredients are then powdered and melted in a Hessian crucible, which must always be closed with a tightly fitting cover. To ascertain whether the mass is thoroughly incorporated, it is stirred with a glass rod and the adhering enamel is inspected. If it contains no traces of unmolten matter, it is cast upon a stone or iron surface.

A Dimi-transparent White: 3 parts common white glass pearls (small); 1 part lead oxide; 1 part feldspar; 1 part potash. Melted and cooled as indicated, then cast into dried clay forms or warmed mortar.

Transparent Blue: 5 parts crystal glass; 1 part cobalt oxide; 1 part borax. First melt the glass, add the borax, and then while well stirring, the oxide. Provide a good cover to keep out ashes, else the mass assumes a dead appearance. It is often sufficient to melt the mixture only once, at other times twice or thrice. Do not cast the enamel until satisfied that all parts are melted and thoroughly incorporated.

Opaque Blue: 5 parts pulverized crystal glass; 1 part calcined sheeps' bones; 1¼ parts calcined borax; 1 part cobalt oxide; ¼ part tin oxide. Pulverize all components. First put in the glass, then the borax; when melted add tin oxide, then bones, lastly cobalt oxide. 1 always had to melt it three times, and give it a strong heat. Never pour it in water, it loses its opacity.

Light Blue: 5 parts crystal glass; ¼ part red lead; ½ part tin oxide; 1 part borax; 1 part cobalt oxide. Melted as the preceding; glass and borax first. Then add the tin, red lead, and finally the cobalt. One melting will be found sufficient, as it is composed of quickly fusible substances. If wanted of light color add less, if darker, add more cobalt. To make it very fusible, add more borax and red lead, or decrease the tin oxide. Instead of cobalt, pure ultramarine may be used. The counterfeit should not be employed, as it loses its color.

Transparent Green: 4 parts crystal glass; ½ part verdigris, ½ part blue carbonate of copper; 1 part borax. Glass and borax are melted and maintained for some time in fusion, then add the carbonate and verdigris. The green and red enamels exact the greatest cleanliness, as they are the most delicate of all. Only a trifle of dust which may fall in during melting, will cause them to appear dead and lustreless. When the entire mass has melted, cast it upon a clear stone surface

and cover it instantly with a glass bell. The green color needs to be smelted only twice.

Opaque Green: 8 parts crystal glass; 1 part tin oxide; 2 parts borax; 1 part calcined sheeps' bones; 1 part verdigris, 1 part blue carbonate of copper. Glass and borax first; subsequently add the remainder one after the other. If it should be too dark, add ¼ chromium oxide at the second melting. This gives it a very pretty leaf-green color.

Intermediate Green: 6 parts crystal glass; 1 part potash; 1 part red lead; 4 parts verdigris; 4 parts borax; 1 part salt. Melted twice, because difficult to intermingle. A froth will arise to the surface which must be removed. Have the casting surface well cleaned from all dust. A bluish green is obtained by the addition of a little cobalt oxide, and mercury dissolved in chromic acid, which is melted, purified in water, and added to the mixture.

Transparent red: 8 parts crystal glass; 1 part manganese ore; 2 parts borax; ¼ part gold purple. Melt glass and borax first, then add the ore, and shortly before casting, the purple, as it bears but a small degree of heat, and everything must be melted clear before it is added. Add -16 nitre at the second melting, but cast as soon as fluid, the purple becomes decomposed otherwise, and the enamel would be full of little gold balls; moreover it loses much of its fiery red color.

Light Red: 7 parts feldspar; 2 parts borax; 3 parts potash; 1 part red mercury oxide; 2 parts crystal glass. Melted as above. Add mercury oxide last.

Violet: 8 parts crystal glass; 2 parts manganese ore; 2 parts borax; ½ part cobalt oxide. Glass and borax first, then the ore, finally the oxide. Add at the second melting one other part borax, which makes the enamel more fiery. A small quantity of gold purple gives it a beautiful color.

Black: 8 parts crystal glass; 2 parts manganese ore; 1 part verdigris; 4 parts borax; 1 part cooking salt. Glass and borax first, then add the ore and the verdigris. Black enamel most generally succeeds well with one melting, more than two are never necessary. The greater the quantity of manganese ore, the richer and deeper the black.

Grey: 8 parts crystal glass; ½ part cobalt oxide; 3 parts borax; ½ part tin oxide; 1 part manganese ore; 1 part potash; 1 part iron oxide. This color is hardly ever used, since it flows only upon 18 karat gold, losing color and turning black-brown upon gold with much alloy. Crystal glass, borax and potash are smelted first, then the ore, lastly the others. Should it be of a brownish tinge, add more ore at the second melting; it must be fused at least five or six times, until a perfect union is had. The brownish mass remaining in the crucible at every smelting must be removed.

THE OPERATION OF ENAMELING.

The different enamels mentioned can only be used upon gold of more than 14 karats, and by intermixing, other colors may be produced, which is left to the taste of the enameler. They may also be made more fusible by the addition of the flux, taking care at the same time, when treating the opaque enamels, to add more tin oxide, because by the simple addition of nitre or borax the enamel might become transparent. It is also very necessary that the enameler should make himself acquainted with the different degrees of heat the several metal oxides can bear; thus, gold purple only bears a low degree, and if raised above a certain limit, it will decompose, and the enamel be full of gold pearls; cobalt, on the other hand, withstands a high degree, in fact, requires a high degree to make the enamel good. The enameler who studies and follows his business with care and attention will soon gather the necessary experience.

The greatest cleanliness must be observed as well in the preparation as in the operation. The article must have little solder, and none where the enamel is intended to flow, because it becomes dull and black by the contact. When the article is returned by the engraver, freed from all cement, it must be washed in alcohol, and should not be touched by the fingers, especially at the places where

the enamel is to run; this caution must undeviatingly be observed with articles for transparent enamel. It is unnecessary to red heat the article, as is done by many; the enamel will adhere better when the article is not heated, because in the case of 14-karat gold, an oxide skin is produced, to which the enamel will not stick closely. When the article is cleaned and prepared, grind in a stone mortar a quantity of the enamel chosen with filtered water as fine as it possibly can be gotten. The water will at first become dirty; pour it off and replace by fresh filtered, and repeat pouring off and replacing until it remains clear. It is well, with green transparent and white opaque, to pour a little chemically pure nitric acid upon it, and to let it remain for a few minutes, but the enamel must have been already ground fine before the application. Decant the acid and rinse with pure water to remove all acidity. A lustrous enamel will not be obtained if it has not been washed sufficiently after the application.

After having been rubbed fine and well washed, and it is not to be applied at the time, cover it at once with a glass bell to keep out all dust; if suspected that dust has settled upon it, wash it at once. If used, mix and stir the enamel with water to a thick batter, and with a hard stick carry and spread it upon the article; when sufficient, extract the water by using a fine cloth or damp brush; if not done well, the enamel will be full of bubbles. It is well, with the white and red, to apply twice, only applying half the quantity at a time, and to give it two meltings.

The above directions having been carried out, place the article into the furnace. Pay close attention to the draught; no matter how carefully you have been in the preliminary preparations, winding up with extracting the water, if the furnace does not draw well, the enamel will be blistered and dull. The description of a furnace I found best adapted, will follow farther on. The article thus covered with enamel is placed upon a piece of sheet iron bent up on two sides, to let the object lie hollow and keep the enamel from running off. This sheet iron is next placed upon an iron plate and placed into the furnace. Do not at once place the article far into it, rather do it by degrees, to well heat it through first, turning the plate repeatedly to expose it equally upon all sides to the heat. When the enamel has run at all points, which may be seen by the glitter, draw out the plate and let it cool gradually to prevent cracking. Pay attention to this.

When the article has become cool, the enamel is filed smooth with an English file, which is repeatedly dipped into water. Do by no means take a coarse file, it might cause the enamel to crack. It is hardly necessary to state that both the filing dust and the water contain a certain quantity of gold. When filed as required, wash the article in alcohol to remove all grease conveyed to it by handling with your fingers, rinse in clear water, and dry over an alcohol flame. When done, put it again upon the described sheet and plate, and place it into the furnace to restore the lustre. If a corner should have sprung out during filing, cover it with enamel and let it run at the same time. Observe the same care and do not let the object cool quickly. If the article to be enameled is too thin or pressed, it should be strengthened at the back by a counter coat of enamel. I always used the deposit obtained by washing the enamel. In case little bubbles should arise at the second melting, heat the article pretty high, which will drive them away.

As already stated, do not have any soldered seams where the enamel is to run. Should this not be even in its color, the operator may blame himself for not having washed sufficiently the enamel. Especially when using the white do not spare pains; it should be washed even during the application.

The highest results are due to the enameling furnace. No matter how much pain and labor may have been bestowed on the preparation of everything, no satisfactory success can be had with a bad furnace. I have seen many different constructions, but none as yet free from all objections. Fig. 2 represents one of my own modeling; if it is not, perhaps, perfect in all its details, yet I will state that it has always answered best for my own use, and will be found the most suitable of all styles. It consists of an iron box, *a b c d*, whose walls

inside are lined with brick to prevent too rapid a burning of the iron; *e* is a half-circular hole, closed by a door, for the insertion of the muffle *m*, beneath which the operation of enameling proceeds; *k* is an iron grate to prevent the coals from falling together during the process; *f* is the air hole draught, and at the same time, the ash box, also provided with a door; an iron slide is placed at *p* to increase or decrease the draught. The cupola, *i* also of iron, can be removed, and also serves as chimney, as well as for the purpose of adding fresh fuel; *g g g g*, are the feet; it may be placed upon masonry if preferred.

When the furnace is required to be heated, the cupola is removed, the grate is filled with coals and set on fire. The muffle *m* is inserted into the door *e*, covered with coal, the cupola replaced and vent *h* is opened for the purpose of draught. Only when the coals inside the muffle begin to glow brightly, and have no black places, the articles to be enameled are inserted; if before this it is well to sprinkle a little alcohol upon the charcoals inside the muffle. This latter is easily prepared. Saw an earthen vessel lengthwise, and bore two or four holes in it to admit the air to the coals within; *n m* give front and side views. If it has too much draught, either close the door at *f*, or the slide at *h*. Such a furnace is far cheaper than any of those in use, and may serve also for assay furnace. Many enamellers give the necessary lustre by polishing their enamels. I must confess that this manner of doing is a good, and even better than by letting the enamel fuse a second time; it becomes far smoother and does not promote the rising of bubbles. After finishing, boil the article only in diluted nitric acid; if too strong it might attack the enamel.

THE REMOVAL OF ENAMEL BY FLUORIC ACID.

It occurs at times that an article has to be freed from its enamel. This was done formerly by covering the article with powdered red cream of tartar, heating it red and cooling it in cold water. This, of course, removed the enamel; never fully, however. From six to eight reheatings had to be made, and cooling each time; still it was not entirely removed, and a re-engraving was necessary; casualties were not wanting oftentimes, by warping, etc.

There is a very simple method of doing this and the article is exposed to no danger whatever, by making use of fluoric acid. Take fluor spar, pulverize it and put it into a leaden vessel about five or six inches high, two to three broad, and four to five long. In this vessel stir the powder with sulphuric acid to a thin batter, and insert the article from which the enamel is to be removed, tied to a lead wire, suspending it with one or two inches above the mixture. Put a lead cover over it, and set it over a slow coal fire until it gets hissing hot. Strong vapors will be developed in it, and from 8 to 10 minutes the article will be free of all enamel, without damage whatever to the gold. If an occasional piece of enamel should be found here and there, re-insert the article and leave it for a short time, and every trace will have disappeared most assuredly.

Never mix more fluor spar than is necessary, because the vessel must be cleaned at once. Be very, very careful not to get any of the vapor on your hands or under the finger nails, because it is very strong and eats through the skin in "less than no time." I had forgotten to put on a pair of gloves when I used the acid for the first time; a little of the vapor lodged on my right hand, most probably under the finger nails. I did not at once feel the pain, but in the course of one hour it commenced to burn under the nails, and in spite of every remedy applied, continued for three days. I made use of all counter agents imaginable, to no purpose, however, and I lost the five nails of this hand. I therefore advise anyone who intends to use fluoric acid, to put on gloves, so as not to share my fate.

Fluoric acid is also used for eating into glass or crystals—which is covered with a coat of wax; figures, landscapes, names, etc., are then sketched upon it, and the article is exposed to the vapors of the acid, as given, and left in until the device is sufficiently eaten in. The wax is removed and the places which were exposed will appear as if ground in.

Another and safer method may be pursued to prevent an exposure to the dangerous vapors. Take a leaden vessel, in the shape of a retort, mix the spar and sulphuric acid in it in the given proportion, close it air tight, heat the retort, and conduct the rising vapors passing through a tube into a vessel filled three-fourths full with water. The tube must conduct air tight into the vessel and reach nearly down to its bottom, so that the acid may be dissolved in the water. After this has become sufficiently charged, submerge the article, and within a few hours the enamel will have been eaten out. The quantity of the vapor necessary can only be ascertained upon trial, as it varies with the amount of water in the vessel. The vessel used in connection with fluoric acid must be cleaned without loss of time, as they are easily attacked; those of platinum are better, but as they are too dear, lead ones are sufficiently good, and by observing great cleanliness will last for a long time.

To Make Chloride of Gold and Nitrate of Silver.

PROCEURE 8 grammes=5 dwts. of fine gold, and after rolling out to thin plate, cut into small strips. Get an olive oil flask, and clean it well with a warm and saturated solution of soda and water. Fill the flask half full of water, and set on a sand bath over a heat that will slowly bring the water to boiling, which will both temper and test the flask: if it stands this test it is fit to be used. Put the pieces of gold into the flask, then mix in a small bottle half an ounce of pure nitric and two ounces of muriatic acid, and pour some of this into the flask to cover the pieces of gold, place it in a sand bath over a gentle heat, and put over the mouth of the flask a small piece of glass to prevent the solution from spiriting out while in action. As soon as the acid ceases to act on the gold, and if any remains undissolved, add of the mixed acid, and continue to add little at the time as often as it stops acting on the gold until it is dissolved; remove then the flask from the sand bath and let it cool, then add to it about its like quantity of water, and boil over a heated sand bath until about half of it is evaporated; remove and pour the solution into a glass or porcelain dish, and rinse the flask several times with small quantities of warm water, which add to the solution.

Now prepare a filter in a small glass funnel, place it in the flask, and filter the solution back, and before the filtering is nearly completed pour a few drops of water at a time into the filter in order to wash the gold out of it, and until the solution is increased to about a third in bulk, then return it to the sand bath and evaporate again to about half; after this pour the solution into an evaporating dish and rinse the flask with warm water and add the rinsing to the contents in the evaporating dish, then add about 1 gr. 50 centigr. of fine table salt for each gramme or $1\frac{1}{2}$ dwts. for each dw. of gold dissolved; place it on the sand bath, stir it well with a glass rod until perfectly dry, then allow it to cool, when it will be ready for use, or to be poured into small bottles for sale. The 8 grammes or 5 dwts. of gold used will realize 24 bottles containing 1 gramme or 15 grains of chloride of gold to each bottle, and will pay well for the trouble of preparation. The chloride of gold prepared in this manner will answer for making solutions for electro gilding or for photographic purposes.

To make nitrate of silver, take granulated fine silver and put into a glass flask similar as used for dissolving gold, pour pure nitric acid mixed with about half the quantity of warm water into the flask to cover well the silver, place the flask in a sand bath over a gentle heat or into a vessel of hot water, which must be kept hot by placing over a spirit lamp until the acid ceases acting on the silver; if silver remains undissolved in the flask, remove it from the sand and let it cool; then pour off the liquid into a porcelain dish, add a little more acid to the remaining silver in the flask, and place it again over heat until dissolution of silver ceases, and keep on repeating the decanting and adding until all the silver is dissolved. By this method an excess of acid is avoided. After the solution has cooled add to it about half its quantity of water and filter it through asbestos broken up and placed in the filter in the neck of the funnel; after filtering pour into an evaporating dish and place it on a heated sand bath and evaporate until you perceive a light scum on the surface of the liquid when it is removed and allowed to cool, and when nearly cold is placed on ice covered over and left undisturbed for twenty-four hours, when crystals of nitrate of silver will form; the crystals are removed with a pair of platinum pincers into a glass funnel placed into the neck of a bottle, and as soon as the crystals have given over dripping pour quickly about an ounce of water over the crystals, and after done dripping repeat it twice more; take the crystals out of the funnel and spread them out on a china plate and place on a warm stove to dry.

Pour then the washings of the crystals back to the remaining silver solution not yet crystallized, evaporate and filter the same as before and set by to crystallize, and repeat the process until nearly all the silver is disposed of. The small remainder of silver

solution may be decomposed into chloride of silver by adding gradually small quantities of salt water.

In order to obtain crystals of large size, the moment of forming the scum on the solution has to be watched during evaporation and advantage taken of by removing it from the sand bath at this point. Another advantage of greatly accelerating the formation of crystals is to put a piece of nitrate of silver into the solution before placing it on the ice. This method will produce nitrate of silver of a better and purer quality than generally bought of dealers.

WILLIS H. HOWES has recently patented a bracelet guage which is entirely different from anything heretofore in use, and is highly recommended by the leading houses in the trade. It is a most ingenious appliance, made of spring steel or other elastic metal, and may be more properly designated as a conformator. Bracelet guages have usually been made upon the erroneous idea that the circumference of a lady's wrist will give the shape. So far is this from being true, that, as a matter of fact ladies' wrists differ as much in their conformation as do their feet or hands. Mr. Howes' guage gives the precise conformation of the wrist, and by its use manufacturers can make bracelets to fit exactly any given wrist. The guage is very simple, indicating in sizes and fractions of sizes the measurement of the desired bracelet, and the form necessary to be given to it to ensure a snug fit to the wrist. Ladies complain greatly that while the stock bracelets they buy may fit snugly in one direction, they bulge out loosely at the sides, making an unsymmetrical band upon their wrists, and destroying whatever charm they may possess in a well proportioned forearm. By the use of the guages this difficulty is entirely remedied, and a bracelet may be obtained that will clasp the wrist as the glove does the hand. It is a most valuable device, and will soon become the standard with all dealers who take pleasure in seeing their customers fully satisfied with their purchases.

Workshop Notes.

Gilt metallic surfaces are best cleaned with a solution of 30 grams borax and 1 kilogram water; rub them gently with it, rinse with cold water, and dry with a soft linen cloth. Picture frames only bear pure water.

Hardening in petroleum of smaller articles of steel, can be recommended. The tempering is done in the ordinary way; the articles remain white and do not warp. Be careful however, not to bring a fire too near the oil.

Mr. F. K. Kaltenthaler, in answer to a correspondent, says, "I use a water stone with crank for the first grinding of my graving tools, and when satisfactorily ground finish them on an American oil stone. It shortens labor and answers well.

Nickelization without battery.—Make a bath of neutral chloride of zinc and a neutral solution of nickel, and boil it. When boiling, throw in the articles, also a small zinc rod and let it boil for some time. A good and durable coating is obtained.

Pinions, arbors, anchors, &c., take a glass hard temper in petroleum. Warm the article, and rule it with soap, thereupon heat it to a red (not white) heat, and quickly immerse it in petroleum. An article so hardened will not warp or twist out of shape.

Color of old wood.—Clock casings and other pieces of wood work will take the appearance of old wood by being treated in the following manner:—Boil 175 grams of dry nut shells for two hours in a litre of water; pour the decoction through a linen cloth; if the shade is too deep, add water, and apply the mixture with a brush.

Dyeing wood.—To color wood black, prepare a strong decoction of campeche wood, to which add a little alum; spread this, by aid of a brush, pencil, or sponge, while hot, on the wood surface, which will thereupon assume a very pronounced violet color. Next take a litre of strong vinegar, dissolve in it either iron filings or turnings, with a few grams of sulphate of copper; also add a little bruised nut galls and a little indigo dissolved in sulphuric acid, and with a brush apply a strong coating of these two solutions. The wood thereupon becomes beautifully black, and the color will penetrate by a repetition. All woods may be stained black with the following recipe: extract of campeche, 30; chromate of potash, 4; water, 2 parts.

Trade Gossip.

James Bros., of Columbia, Tenn., are the successors of J. H. James of that town.

Louis Rothschild, of Rothschild Bros., sailed for Europe in the *Germania* April 30th.

Onyx and pearl jewelry is very effective, and many new and elegant designs are now offered.

Albert Lorsch left for Europe May 4 in the steamer *Gallia*, to look after his fall importations.

A recent earthquake in California stopped all the pendulum clocks in the stores of the Sacramento dealers.

F. Kroeber, the well known dealer in clocks, sailed for Europe May 28, in search of novelties in his line.

J. S. Franklin, formerly of the firm of Earl & Franklin, is now in the employ of Carter, Sloan & Co., as city traveler.

Lace pins bearing the initial letter of the wearer in script letters, studded with diamonds, are among the latest novelties.

Wm. Trier, of Messrs. Trier Bros., left for Europe in the steamer *Salsa*, May 7th, to purchase novelties for the fall trade.

Large and medium sized pearls are still advancing in price, in consequence of so many of them being now employed in decorating jewelry.

Errico Bros. have removed from No. 19 to 31 John street, which they have neatly fitted up for the display of coral, silver filagree and other goods.

Henry Fera sailed for Europe in the steamer *Herder*, May 5. Mr. Fera has recently added to his stock of diamonds an attractive line of rich jewelry.

L. P. Juvet, of Glens Falls, N. Y., received a special premium at the Melbourne Exposition for the Time Globe previously described in *THE CIRCULAR*.

Simpson, Hall, Miller & Co. have been awarded a gold medal for artistic excellence in silver-plated ware exhibited by them at the Melbourne Exposition.

Onyx lockets, with silver decorations, are attracting considerable attention. Back combs, mounted in silver, with onyx faceted balls, are much worn and greatly admired.

Aikin, Lambert & Co. have been awarded a gold medal of the highest order of merit for their gold pens, pencil cases, pencils, etc., displayed by them at the Melbourne Exhibition.

Among the latest novelties in silver goods, designed especially for summer wear, are found lace pins, ear knobs, hair pins, scarf pins, sleeve buttons, etc., of various devices and designs.

Joseph Muhr, of H. Muhr's Sons, of Philadelphia, was married May 7th to Miss Emma Froelich of New York. The happy couple are now traveling through the country on their wedding tour.

The chains recently stolen in Washington from Mr. Duffy, traveler for Knos Richardson & Co., have been recovered, as we predicted they would be, and the goods are now in possession of the firm.

There has been another cut in the prices of making gold cases which knocks all profit "higher than a kite." If this thing continues manufacturers will make cases for nothing and throw in the gold and the spring.

The diamond market on the other side of the water is firm with an upward tendency. Medium class goods of standard sizes are scarce, and prices are advancing in consequence. The craze for diamonds with a blue tinge still continues.

Wilkinson & Lennon have removed from No. 212 Broadway to 142 Fulton street. Mr. Lennon is an artist of recognized ability, and his designs of badges, emblems, and other special devices betrays a thorough knowledge of art work in jewelry.

Joseph Fahys is now comfortably located in his new business home, No. 38 Maiden Lane. His new office is fitted up in a substantial and attractive manner, and affords him greater facilities for transacting business than he has heretofore enjoyed.

The demand for diamond jewelry continues to increase, and it is confidently predicted that more diamond work will be sold this year than ever before in any one year. Many of our importers are now abroad looking for the best diamond goods to be found in Europe.

A bill has been presented in the New York State senate entitled, "An act in relation to assignments, transfers or conveyances made with intent to hinder, delay, or defraud creditors." It was accompanied by a petition in favor of its passage signed by many business men in New York.

J. P. Stevens, of Atlanta, Ga., one of the most enterprising jewelers of the south, was in the city recently, but was taken suddenly ill and had to return home forthwith. After making a few purchases, he was obliged to forego calling upon many of his numerous friends on account of his illness.

There were many removals in the trade on the 1st of May, and the offices in Maiden Lane have been in a general state of upsidownness in consequence. At this writing the movers are in their new quarters, and are so nearly settled that they begin to feel at home, enjoying to the full their enlarged and improved office facilities.

The assignee of M. Kronberg has given rise to considerable complaint in the trade by reason of his dilatoriness in closing up the business of the assignor. Some few creditors, it is said, have received their full dividend, but others being unable to obtain from the assignee either a dividend or a courteous reply to their inquiries. It may be necessary to solicit the intervention of the Court to compel him to close up his assigneeship.

The building on the northeast corner of Broadway and John street, is to be torn down shortly, and is to be replaced by an elegant building, embracing several numbers in John street. It will be finished off in offices suitable for jewelers, affording them greater conveniences than can be obtained in most of the buildings now occupied by the trade. The new building is in the hands of enterprising capitalists, who promise to spare no expense in finishing it to the satisfaction of the trade.

A meeting was recently held at the Astor House of a few of the creditors of Post & Spier, to listen to a proposition made by Mr. Post looking to a compromise. He offered twenty-five cents cash on the dollar, which proposition was refused. Another offer, based on fifty cents on the dollar, was also declined. It will be remembered that criminal proceedings have been instituted against Mr. Post, and there seems to be an inclination on the part of his creditors to let these proceedings take their course.

The New York Jewelers' Club will pay a visit to Providence, July 6th to play a game of base ball with the jewelers' club of that city. It will, no doubt, be a spirited contest, as the members of both clubs are devoting their leisure time to practicing with ball and bat. The New York boys are all getting up their muscle, and it will be well for the citizens of Providence to see that the game is played far outside the city limits, lest some of their fine buildings should be injured by the vigor that will characterize this game.

On the evening of the 8th ult., three masked burglars effected an entrance into a large building occupied by a number of manufacturing jewelers, in Dyer street, Providence, R. I., and compelled the watchman to open the door of the workshop of W. Smith & Co., manufacturers of gold chains. The thieves spent three hours trying to open the vaults, in which a large quantity of gold chain was deposited, but failed in the attempt. They left the watchmen bound and gagged, in which condition he was found by the police.

A prominent importer in Maiden Lane recently sent the office boy to make a deposit at the bank. A fractious horse attracted the boy's attention, and he dropped the deposit book containing \$1,200 in money and several checks. The money was picked up by a gentleman, who found the firm's name on the deposit slip, and returned them the money and checks before the boy had time to report his loss. The modesty of the gentleman prevented his giving his name, but the firm discovered it, and had the pleasure of making him a handsome present. But that boy, oh!

A newsboy was passing along Maiden Lane, when he chanced to discover a purse of greenbacks. He was at first inclined to conceal it, but repelling the unworthy suggestion, he asked a Providence drummer if it was his'n. The man with a square bow looked at hurriedly, said it was and patted him on the head, gave him a quarter, and said he would yet be president. The itinerant drummer then hastened away and came near being arrested for having counterfeit bills in his possession, while the honest newsboy played penny ante with his humble quarter and ran it up to \$2.62.

The question is often asked, "What constitutes a diamond expert?" Some claim that he should be able to give an exact analysis of stones, and tell precisely what each one is composed of. This is necessary for a scientist, but scientists are not always judges of the market value of stones. The true expert, according to our judgment, is the one who can take a parcel of unassorted diamonds of all grades, and give them their classification, determining what they are worth in the market. To do this he must have a full knowledge of the component parts of a diamond, and the relations those parts must bear to each other to give it its greatest value; he must be able to classify them according to their most delicate shades of color, their brilliancy, their various degrees of hardness, and as to their cutting. These are points that regulate the market value of diamonds, and he who can satisfactorily determine that value must be regarded as an expert. It is safe to say that there not a dozen such in the United States.

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THE JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

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Encouragement for Culture in Artistic Jewelry.

THE jewelers' art has ever been classed among the fine arts, and to its skilled workmen the public has looked for examples of artistic work in wrought gold and silver. But the trade in this country apparently makes little effort to improve in artistic excellence, being content instead to copy the work of the old world artists. America, with its magnificent and varied scenery, its progressive spirit, and its liberal encouragement of the arts, should be the pioneer in cultivating new fields in the art realms. Indeed, in most branches of the fine arts she has taken a front rank, but comparatively little that is new in wrought gold and silver, from an artistic standpoint, has been accomplished by our jewelers. This is mainly the fault of our manufacturers, who neglect to give that incentive to designers and workmen that is calculated to develop originality in designs and workmanship. In England, the various societies within the trade offer premiums of considerable value for designs and for skilled work in the precious metals, and these prizes have wonderfully stimulated artistic conception. We have before us a list of prizes offered by the Goldsmiths' Hall, of London, for the tenth annual competition, for the best original designs or models of gold and silver work. There are twenty-six prizes in all, ranging from £10 to £50, aggregating £500 or \$2500 in all, in addition to which a traveling scholarship of £100 may be awarded for exceptional talent. The subjects selected for competition embrace the whole range of precious metal work, from a design for a salt-cellar to models of statues ready for casting. In this country we have seen Mr. Prang offering large prizes for designs for Easter cards, and manufacturers of artistic furniture, of paper hangings, and of various other articles wherein artistic skill may be called in, offering valuable premiums for original designs that may be used in their business. But our manufacturing jewelers offer no incentives of this kind to the young men who are ambitious to make their mark in the world, and who would gladly

compete for similar prizes. We have within ourselves all the talent, skill and capacity to enable us to take first rank among the workers in precious metals, but sufficient inducement is not offered to bring out this latent talent. What is needed is an art school within the trade, where artists and workmen could receive that technical training necessary to make them artistic designers and skilled workmen. There is no reason why this should not be done. There is sufficient demand for such work to make an institution self sustaining, almost from the very beginning. It would well repay a half dozen of our leading manufacturers to club together and adopt such means as may seem best to develop more and better artistic work in the precious metals. We are sick and tired of stating from month to month that "John Jones, a prominent jeweler, is now in Europe looking for novelties in his line." Why not make these novelties at home, and not be content with adopting European styles after they are a season old? During the past few years a vast impetus has been given to decorative art in this country, and there are comparatively few persons nowadays who are not fair judges of artistic efforts. It becomes, therefore, all the more important that those who have the direction or cultivation of the artistic taste in hand, should lead it to appreciate that which is excellent instead of a counterfeit imitation. No more striking illustration of what can be done by an individual in directing public taste in artistic channels can be given than that set forth by Mr. Prang. He was the pioneer of chromo publishing in this country, and his earlier efforts, although crude and inartistic, have developed into an immense business, wherein he gives employment to a large number of first class artists, and some of his productions are gems in their way. In the matter of Easter cards alone, he has created a public demand for work that is not only artistic in design, but in execution as well. He has carried his public with him as he has climbed the ladder of artistic excellence, and the cheap chromos with which he began would not be tolerated to-day. He has by no means achieved perfection, but by calling to his aid a small army of artists, and giving them special inducements to improve the character of their work, he has made vast improvements in the excellence of his productions. He has also created a demand for Easter and Christmas cards that brings to him and rival publishers hundreds of thousands of dollars annually. And, we may remark here, that some of our manufacturers of jewelry have taken up the idea of making special designs for Easter jewelry, and found their profit in so doing. But it is a singular fact that the ideas of some of their designs was copied boldly from the prize designs for which Mr. Prang had paid so liberally. It is a reproach to those manufacturers that they had not enterprise enough to follow Mr. Prang's example, and pay a fair price for designs they deemed worth using.

There is a constant demand for new designs and artistic workmanship in the precious metals. Fashions in personal adornment are constantly changing, and the popular taste craves something new and original whenever a change is made. People are tired of the hackneyed Roman, Egyptian, Japanese and Etruscan styles, and want novelties, something that combines originality of design with richness of metal and artistic workmanship. These can be, under proper inducements, obtained as readily and more satisfactorily from native talent than by depending so largely upon European markets. As

our people become more wealthy, their tastes become more cultivated, and they demand more elaborate examples of the goldsmith's work than heretofore, and gold and silver plate of unique designs is much sought for. For this class of work we are more dependent upon Europe for specimens than in anything else. We hope soon to see this remedied, and such inducements held out by our manufacturers as will tempt our own artists and skilled workmen to put forth their best efforts. As an indication of what is being done to encourage technical education abroad, we append here the full list of prizes offered by Goldsmiths' Hall of London for its tenth annual competition:

A prize of £50 for the best model in plaster, finished ready for casting, of a group "Man and Horse," the extreme height of the man not to exceed 12 inches.

A prize of £20 for the second best model.

A prize of £35 for the best specimen, executed in repoussé work, of the figure of Bacchante, by Scopas, a copy of which may be procured by intending competitors, at Goldsmiths' Hall, upon the payment of 3s. 6d., which sum will be returned to every actual competitor at the close of the competition. The figure is to form the top of a box or casket, which top shall be of the size of 9 inches by 6 inches, including a half-inch margin on every side.

A prize of £20 for the second best specimen.

A prize of £30 for the best design of silver candlestick, with branches to carry five lights, not to exceed 24 inches in height, the cost of which, when manufactured, would not exceed £80.

A prize of £20 for the best design of a silver dessert stand, for fruit or flowers, not to exceed 12 inches in height, the cost of which, when manufactured, would not exceed £30.

A prize of £20 for the best workmanship in a finished piece, answering to these last-mentioned particulars.

A prize of £20 for the best design of a coffee and tea service, (of four pieces) the cost of which, when manufactured, would not exceed £60.

A prize of £20 for the best workmanship in a finished service, answering to these last-mentioned particulars.

A prize of £20 for the best design of a silver tea kettle, the cost of which, when finished, would not exceed £60.

A prize of £20 for the best workmanship in a finished piece, answering to these last-mentioned particulars.

A prize of £20 for the best design of an ink-stand, the cost of which, when finished, would not exceed £50.

A prize of £20 for the best workmanship in a finished piece, answering to these last-mentioned particulars.

A prize of £20 for the best design of a bowl for flowers, salad, etc., the cost of which, when manufactured, would not exceed £25.

A prize of £20 for the best workmanship in a finished piece, answering to these last-mentioned particulars.

A prize of £10 for the best design of a salt-cellar, of which the cost of a pair would not exceed £8.

A prize of £10 for the best workmanship in a finished piece, answering to these last-mentioned particulars.

A prize of £10 for the best design of a bowl for flowers, salad, etc., the cost of which, when manufactured, would not exceed £80.

A prize of £20 for the best workmanship in a finished piece, answering to these last-mentioned particulars.

A prize of £15 for the best design of a tankard with cover, the cost of which, when manufactured, would not exceed £80.

A prize of £10 for the second best design.

A prize of £20 for the best workmanship in a finished piece, answering to these last-mentioned particulars.

A prize of £10 for the second best specimen.

A prize of £15 for the lightest and best specimen of core casting in silver (the jets to be cut off, and the seams from the mould to be left absolutely untouched) of a figure of Jupiter, a copy of which may be procured by intending competitors, at Goldsmiths' Hall upon payment of the sum of 5s., which sum will be returned to every actual competitor at the close of the competition.

A prize of £25 for the best specimen of engraving of the figure of "Agriculture" in "Aratra Pentelici," a photograph of which may be obtained by intending competitors at Goldsmiths' Hall.

A prize of £10 for the second best specimen.

The cost of the manufactured articles is not intended to include the expense of designs, of models, patterns, or dies.

Everything offered for competition must have been made within the present year, and by a British subject, and the prizes will only be given to the actual exponents.

All designs must be drawn, and all models made, to exact size,

and be accompanied by an approximate estimate of weight and cost. All necessary sections must be given.

Any partial gilding must be shown on each design, or model.

An indication must be given on each drawing, showing which parts are to be hammered, which chased, and which cast and chased.

Originality shall be necessary to obtain either of the prizes for design, and no copy shall be the subject of a prize.

We should be pleased to announce that our leading manufacturers of gold and silver ware had offered similar prizes to the above for similar work.

Economy in Workshops.

THE waste that annually occurs in the workshops of manufacturing jewelers aggregates a large sum, and constitutes one of the leaks through which profits percolate slowly but surely. It is almost impossible for manufacturers to prevent this waste, but, if they have the correlative support of their workmen, it can be materially reduced. While the workmen employed in the shops are, as a class, men of unquestioned integrity, they are, nevertheless, apt to grow careless from constantly handling the precious metals, and not to be as saving in its use as they would be if it was their own property. Occasionally, too, an unprincipled man gets a place at the bench, who does not scruple to rob his employer at every opportunity. Indeed, instances have occurred where a ring was formed among the workmen for the purpose of stealing the gold entrusted to them to be made up. When the workmen thus conspire against their employers, the "waste" of the shop very quickly eats up the profits of the business. Naturally, all dealers in precious metals are suspicious; the valuable articles in which they deal are put up in such small parcels that they are easily appropriated by thieves, and if such thieves frequent the workshops, their detection is rendered especially difficult. One manufacturer recently told us that, after investigation, he had reason to believe that his workmen had robbed him of \$50,000 worth of gold in three years. He had placed implicit confidence in them, but recently discovered that a ring had been formed among them, and they were systematically stealing the gold sent to the factory to be made up. Of course, manufacturers universally take general precautions against being robbed, keeping an account of metal sent to the factory and of the finished goods returned, but when a conspiracy is formed against them, robbery can go on and almost defy protection. It is very easy for workmen to extract gold, and add base metal in the alloy, or to put brass wire into certain classes of goods instead of gold, and by various tricks deceive the proprietor, especially if the melter is included among the dishonest ones. Various means are adopted to ascertain whether a workman brings back, in completed work and filings, full weight for the gold issued to him, but if the gold has been debased and the filings are half brass, it is almost impossible to detect the cheat. A gentleman who has long been in the manufacturing business, informs us that he has had comparatively little trouble with his workmen in a long series of years on the score of dishonesty. He adopted the plan of putting them on their honor, and making it to their advantage to aid him in preventing thieving. At the same time he did not neglect ordinary precautions. He served out the gold to the melter, and gave instructions as to the alloy to be produced. When the metal was returned, he had it passed under rollers, and from the sheet thus produced, he clipped off a small piece which he retained. By this means he had a check on the melter. When the gold thus prepared was given out to the men to be made up, no one would have ventured to play tricks with it, for no one could tell which of the articles made were to be tested by the sample of gold retained by the manufacturer. But besides this precaution, he gave the men to understand that they were on their honor, and so long as they served him honestly they should have employment; but if they were caught stealing, he would show them no mercy. For their own preservation the men became interested in preventing thievery, and when a new band was taken on, he was watched by all with the greatest vigilance. Occasionally a thief would be detected, and in such cases the offender was prosecuted to

the full extent of the law. The employer acted conscientiously in the matter, believing that by punishing offenders he was doing the community a service, and taking measures to prevent his other workmen falling into temptation. Workmen are apt to say "our employers watch us as if we were thieves; they suspect us all the time; we may as well have the game as the name." They forget that the dishonesty of a few of their number compels employers to take measures of precaution. If there had never been any stealing there would have been no occasion for watching. Employers do not suspect the majority of their workmen, but because a few are open to suspicion, precautionary measures must be applied to all.

We allude to this subject for the purpose of saying to the men in the shops that it is to their interest to aid employers at all times to prevent "waste" in the factory, whether from petty stealing, carelessness, or any other cause. Their reputations are involved if the "waste" is excessive, and they should join hands with the employer to prevent it. If they suspect dishonesty, they should make their suspicions known, by which to clear their skirts at least. A workman who sits quietly by and sees some of his comrades engaged in dishonest transactions, is little better than they if he does not expose them. We know that a feeling exists that it is dishonorable to be an informer, but there is not discredit attaching to information given regarding a criminal act. If the honest workmen would co-operate heartily with their employers in this matter, the thieves would soon be driven from the factories, and a large portion of the "waste" prevented. If the large sums now annually charged up to "waste," could be entered to the profit account, manufacturers could afford to share the benefit thus obtained with their workmen, in the way of paying better wages. But so long as an employer has not full confidence in his workman, he will not only have them carefully watched, but will not feel liberally inclined when the question of wages comes up. The interests of the employer and the employed are identical; the prosperity of the one includes the prosperity of the other in a proportionate degree. That prosperity is largely dependent upon the workmen themselves. If they do their duty honestly and to the full extent, their employers have at least an equal chance with their competitors. If the reverse is true, the employer is placed at a great disadvantage by reason of the greater cost incurred in the production of his goods. Let the "waste" be turned into profit by the vigilance of the workmen, and the manufacturer is at once relieved of a heavy expense.

Benevolent Societies and the State Law.

THE recent agitation relative to legislation calculated to make all benevolent societies amenable to the insurance laws, has had the good result of securing a law which not only protects the benevolent societies, but gives the state insurance officials jurisdiction over the swindling co-operative concerns that steal the livery of benevolence to perpetrate outrageous frauds in. THE CIRCULAR has vigorously protested against having the benevolent societies classified with these speculative concerns, that deal in death-bed insurance, in the interests of the ring of officers that controls them, for their methods and motives bear no nearer resemblance than light does to darkness. But the old line life insurance companies and the state officials persisted in condemning the assessment plan of paying benefits, and in making no distinction between the purely benevolent associations and those that were managed for money-making purposes. So long as this was so, and the legislation proposed threatened to cripple the benevolent societies as well as the speculative concerns, the former had no escape from opposing such legislation. The influence they brought to bear was sufficient to control the legislature on this subject, and the regular life companies found themselves powerless to push through the measure they had so confidently counted upon. Finally the representatives of the benevolent societies invited and had a conference with the state officials, and as a result of such conference, the bill was agreed upon which has since become a law. This provides that all benefit societies conducted upon the assessment plan, shall report

annually to the Insurance Superintendent the details of its business, showing all moneys received and disbursed, the number of members admitted and withdrawn, and, in fact, to make an official report that shall show its transactions during the year. They are not required, however, to deposit \$100,000, nor to keep a reserve fund equal to their liabilities, as the life insurance companies are.

The present law is satisfactory to all the parties in interest. Every honestly managed benevolent society will have no objection to making annual reports; on the contrary, such official supervision will tend to increase public confidence in them, and their membership may be expected to be increased in consequence. But no fraudulent concern will ever make reports, for there is nothing they so much dread as letting in the light on their management. As a consequence, they will steer clear of New York state, and not bring the assessment plan of benefits into contempt. Few persons outside of this state can realize how great was the feeling during the pendency of the legislation which threatened the very existence of every benevolent society in the state. The 380,000 members of the various societies were indignant alike at being classed with swindlers and at the arbitrary legislation that proposed to prohibit their dispensing their charities as they pleased. The officers of the Jewelers' League were very active in the matter, and to the President, Mr. Woglom, as much as to any other one person, are the societies indebted for the satisfactory result which removes all cause of apprehension of hostile legislation in future. He was a member of the committee that visited Albany on several occasions, and his influence was used with legislators to excellent effect. The League cannot fail to derive benefit from the legislation which virtually gives official endorsement to its financial standing and its business methods.

The "Drummer" Tax Law.

IN THE CIRCULAR for June we commented upon the obnoxious law enacted in Texas, whereby traveling salesmen are forced to pay a license tax, such tax not being exacted from residents of the state. Alabama, Virginia, and one or two other states have similar laws, and they have always been felt to be an unwarranted restriction imposed upon inter-state commerce, and unjust to non-residents, as they discriminated against them, and in favor of resident dealers. A decision of the Supreme Court of the United States, delivered in October, but only recently promulgated, will put an end to all this petty taxation of traveling salesmen, inasmuch as the Court holds that all such laws are unconstitutional. As this is the Court of last resort, the decision is final, and traveling salesmen are at liberty hereafter to invade any state they choose, regardless of those enactments which are called "drummer" tax laws.

The case before the Court was that of J. T. Webber, plaintiff in error vs. the state of Virginia. Webber was a salesman for the Singer Sewing Machine Company, and was arrested in Henrico county, Virginia, for selling goods without a license. The law of the state exacts a license fee of \$25 from persons selling goods made outside of the state, in any county within the state, and \$10 additional for each additional county in which he sells goods. Webber was indicted in the Henrico county court, tried and convicted, and fined \$50. He carried the case to the Supreme Court of the State, where the judgment of the lower court was sustained. He carried it then to the Supreme Court of the United States, where the decision of the state court was reversed, on the ground that the law imposing the tax was in violation of the constitution of the United States. Justice Fields delivered the opinion of the Court, all the other Justices concurring. One ground of the defense was that Webber was selling a patented article, and that letters patent gave the owners of them the right to sell articles made under them in any state in the Union, without being subject to taxation. This point the Court overrules, on the ground that the states have a constitutional right to regulate their own affairs, to impose taxes, and to raise revenue in such manner as they may deem best.

The Court said that the law of Virginia stipulates that "the agent

for the sale of articles manufactured in other states must first obtain a license to sell, for which he is required to pay a specific tax for each county in which he sells or offers to sell them; while the agent for the sale of articles manufactured in the state, if acting for the manufacturer, is not required to obtain a license or pay any license tax. Here there is a clear discrimination in favor of home manufacturers and against the manufacturers of other states. Sales by manufacturers are chiefly effected through agents. A tax upon their agents when engaged thus is, therefore, a tax upon them, and if this is made to depend upon the foreign character of the articles, that is, upon their having been manufactured without the state, it is to that extent a regulation of commerce in the articles between the states. It matters not whether the tax be laid directly upon the articles sold or in the form of licenses for their sale. If, by reason of their foreign character the state can impose upon them or upon the person through whom the sales are effected, the amount of the tax will be a matter resting in her discretion. She may place the tax at so high a figure as to exclude the introduction of the foreign article and prevent competition with the home product. It was against legislation of this kind that the framers of the constitution intended to guard when they vested in Congress the power to regulate commerce among the several states. In *Welton vs. the state of Missouri*, we expressed at length our views on the subject, and to our opinion we may refer for their statement. No one questions the general power of the state to require licenses for the various pursuits and occupations conducted within her limits, and to fix their amount as she may choose, and no one on this bench—certainly not the writer of this opinion—would wish to limit or qualify it in any respect, except when its exercise may infringe upon the just authority of the federal government under the constitution or the limitations prescribed by that instrument. But where a power is vested exclusively in that government, and its exercise is essential to the perfect freedom of commercial intercourse between the several states, any interfering action by them must give way. This was stipulated in the indissoluble covenant by which we became one people.

Commerce among the states in any commodity can only be free when the commodity is exempted from all discriminating regulations and burdens imposed by local authority by reason of its foreign growth or manufacture. The judgment of the Supreme Court of Appeals of Virginia must, therefore, be reversed, and the cause be remanded to it for further proceeding, in accordance with this opinion, and it is so ordered."

This settles the law for every state in the Union. Traveling salesmen need no longer fear these state license taxes, but may boldly defy the town constable, and sell their goods in the highways and the byways without let or hindrance. Every court in the land is obliged to recognize this ruling of the Supreme Court of the United States, but, as some of them may not yet have seen it, we would advise travelers to provide themselves with a certified copy of it. For this purpose they may address James H. McKenney, Clerk of the Supreme Court of the U. S., Washington, D. C. The decision is numbered 1,136, October Term, 1888.

The Watchmakers' and Retail Jewelers' Guild.

THE annual meeting of the Grand Lodge of the Watchmakers' and Retail Jewelers' Guild was held at Rock Island May 11. The report of the proceedings was so delayed that they did not reach us for the June issue of THE CIRCULAR.

The president, W. N. Boynton, in calling the convention to order made the following remarks: Gentlemen, I wish to impress upon your minds the fact that you have been selected by your State Associations as persons well qualified to represent their interests in this convention of the Guild. I hope you have come prepared to take such action as will meet the approval of the several associations you represent. Action that will tend to add additional force to the working condition of our organization by bringing about a more complete co-operation of the several state associations, it is in this union of

action our complete success depends. And this union of action can only be obtained by our pursuing a course consistent, wise, and just.

Our organization was forced into existence by the long piled, oppressive depredations of the too grasping jobbers. Our territories had been invaded, our commercial rights ignored. We rallied more for defensive war than as dictators of law. It was new business to all of us, and it would indeed be strange if no mistakes were made. When the Catholics of Scotland burned the Presbyterians, they did a wrong. When the Presbyterians came into power, and in turn burned the Catholics, they too did wrong. No two wrongs can make one right. We have grown from the insignificant number of 45, to the dignity of nearly 1,400.

Now let us conduct ourselves in keeping with the dignity of our numbers. To make this dignity respected, it must be clothed in the garments of prudence, wisdom and justice.

I think it would be well to have a committee appointed to consider and arrange some equitable method for placing non-conforming jobbers on our Black List, and the action of this committee submitted to the several State Associations for ratification. This matter of placing jobbers on our Black List should be guarded with much care, in fact it should, in my mind, be our last resort. But when forced to do so, let us do it with that union of action, that they may feel the weight and determination of our numbers; they will then realize that our organization is one of force and character, and to be respected. To command this respect, we must see that the dignity of our organization is not imposed upon by members of our associations, who may have become piqued at some house, by reason of a difference in book accounts or some other private matter, and would seek to use our organization as a weapon to battle a personal matter. To all such I would say, "Look to the common courts for redress." Our organization must be used only to enforce the laws it has made. In my mind these vital points can be best protected, by placing the formation of our Black list in the hands of the Executive Committee of each State Association, who shall have charge of all complaints, of wrongs done the retail trade of their respective state by the jobbing houses, and shall thoroughly investigate the nature and foundation for the charge made, which, if proven well founded, they shall notify the parties against whom the charge is made, of the facts and character of the same, setting a reasonable date for the parties to provide their defence. If the parties so notified fail to make good their defence, by want of attention or facts, then they shall be subject to a reasonable fine for the offense, which, if not paid within 30 days from notice of rendering decision, they shall then be placed on the Black List of every State Association, and remain there till the parties wronged and the association offended are satisfied. This is merely a suggestion of mine for your consideration, and subject to any changes your Committee may see fit to make.

Gentlemen, there is another important matter I wish to call your attention to, and that is, the subject of dues for maintaining the Guild, which as a Grand Lodge has no revenue of its own. Thus far it has lived by the liberality of its officers and donations from delegates. In my mind its Secretary should receive a salary, and its President his traveling expenses in attending the meeting of the Guild. This in the aggregate would be but a small tax on each association, yet too great a burden for anyone holding the office to bear. Do not think me aping some of our able statesmen in trying to figure back pay. I only wish to provide for my honored successor.

Secretary Joseph Baker then called the roll of officers, Capt. Shurley of Chicago, chairman of Executive Committee, being absent by reason of sickness. The minutes of the last meeting were read, amended and approved.

On motion the chair was instructed to appoint a committee of five to determine upon some equitable method, to be adopted by the several State Associations in conducting the investigation of charges made against jobbing houses, and placing wilful offenders on our Black List.

The following were appointed: C. A. Estberg, Waskesha, Wis.; W. R. Weld, Waterloo, Iowa; J. E. Boynton, Jerseyville, Ill.; Theo. Schell, Milwaukee, Wis.; W. H. Thorp, Beaver Dam, Wis.

On motion, by Mr. Chase of Winterset, Iowa, the chair appointed a committee of three to determine on the amount of dues to be paid by each State Association to the Guild for maintaining the same and to fix the salary of its Secretary and traveling expenses of its President.

Applications of H. A. Wright of Ashland, Oregon, and L. Russell, of Bowling Green, Mo., were received and they were duly elected members of the Guild.

While the committee were framing their reports, a general discussion was held, the following being the topics discussed:

The growth of our several State Associations and the good our organization had done, in the complete suppression of the promiscuous circulation of catalogues. The friendly feeling our Associations and conventions had created amongst the retail trade, where before, rank hatred and jealousy existed. The great good arising from the adoption of our uniform price list for bench work, on which over one thousand jewelers in the north-east are to-day working, bringing about a friendly feeling amongst the craft and confidence and respect in the minds of our customers. The manner of managing customers in selling goods. On selecting and adjusting spectacles to the eye. The great benefit we receive in meeting together in convention, where an interchange of ideas are had, from whence all our knowledge has sprung. The advantage accruing to members of our organization by having a Guild stamp for our goods, to be sold only by members of our associations.

The manner in which these subjects were discussed, displayed interest, thought, ability, and correct ideas of human nature, far beyond what has generally been credited to the craft.

Mr. Estberg, chairman of committee on "method of forming Black Lists," submitted the following report, which was adopted:

Mr. President, we, your committee appointed to draft a form to be used by the several State Associations, in placing non-conforming jobbers or their agents on our Black list, and for the purpose of bringing about a more complete co-operation of the several state organizations, do recommend for the ratification of the several State Associations, the following to wit: The Executive Committee of each State Association shall have charge of all complaints made by its members against jobbing houses or their agents, and shall carefully investigate the same, and if good and sufficient grounds are found to exist for the charges made, the said committee shall then notify the offenders of the kind and character of the offense, appointing a reasonable time and place for hearing the defence, which, if not sustained by want of attention or facts, the said committee shall then submit their findings with the evidence for the same, for the action and approval of the Executive Committee of the Guild, and if the findings of the State Executive Committee are approved, then the names of the offending parties shall be sent to the chairman of each State Executive Committee to be placed by him on the Black List of his respective state, and to remain thereon till the parties wronged and the association offended shall be satisfied, and we ask that each state adopt the same.

Respectfully submitted,

C. A. ESTBERG, Chairman.

Mr. Chase, chairman of committee on "dues for maintaining the Guild" made the following report, which was adopted.

That each State Association shall pay a per capita tax into the treasury of the Guild, on or before the first day of May of each year, the sum of fifty cents for each active member of such association, to entitle them to representation to the United States Guild. That the President of the Guild be allowed his legitimate traveling expenses and hotel bill when attending the convention of the Guild. That the Secretary be allowed one hundred dollars a year for his services.

Respectfully submitted,

A. B. CHASE, Chairman.

The Treasurer reported that after paying all the expenses of the past year, that there was a balance in his hands of \$3.40. A dona-

tion of \$20 was made by the delegates present for the immediate use of the Guild for printing purposes.

The following resolutions were unanimously adopted:

Resolved, That the Jewelers' Guild of the United States, does condemn and disapprove of the practice of publishing catalogues and price list of any kind except those that are so marked as to be intelligible to dealers only.

Resolved, That any jobber or manufacturer who publishes net prices in watchmakers' magazines or trade papers, is working a great injury to the retail trade, and that we, as members of the different State Associations, do disapprove of the same and respectfully ask that it be discontinued.

Resolved, That we do recommend to the watchmakers and jewelers of the United States, the Iowa schedule of prices for bench work, of which upwards of one thousand are now in use.

Resolved, That while we fully acknowledge the legal right, according to the laws of our land, of the manufacturer of watches, clocks, jewelry, silver and plated ware, and wholesale dealers generally, to sell to whom they see fit at prices they may be pleased to make. But we retail dealers should in no case buy goods of any manufacturer or jobber who, ignoring our commercial rights as retailers, fails to protect our trade and profits.

Resolved, That the names of those houses which are on the Jewelers' Black Lists, be published from and after July 1st, 1881, in a monthly jewelers' trade paper, as such houses as the Jewelers' Association refuse to buy of.

Election of officers for the ensuing year resulted as follows:

President, W. N. Boynton, Manchester, Iowa. Vice Presidents, C. A. Estberg, Waskesha, Wis.; W. R. Weld, Waterloo, Iowa; J. E. Boynton, Jerseyville, Ill.; John Baumer, Omaha, Neb.; J. W. Cathcart, Jackson, Mich.; W. H. Thorp, Beaver Dam, Wis.; J. P. Angell, Pine Bluffs, Ark.; A. J. Lawrence, Columbus, Kan.; L. Russell, Bowling Green, Mo.; H. A. Wright, Ashland, Oregon; Secretary and Treasurer, Joseph Baker, Rock Island, Ill.; Executive Committee, C. A. Estberg, Waskesha, Wis.; W. R. Weld, Waterloo, Iowa; O. E. Curtis, Decatur, Ill.

On motion the following resolution was adopted:

Resolved, That the thanks of this organization are hereby extended to D. H. Hopkinson, Editor of THE JEWELERS' CIRCULAR, of New York City, to H. A. Pierce & Co., editors of the *Watchmaker & Metalworker*, of Chicago, and to W. W. Wilcox, editor of the *Jewelers' Journal* of Chicago, Ill., for the interests taken in our behalf, and for the valuable space given us in their papers, and that each of the above named gentlemen be supplied with a copy of our proceedings.

Resolved, That the proprietor of the Rock Island House, Charles Jarvis, Esq., is entitled to our thanks, which are hereby extended for his kind and gentlemanly attention to our wants, and for the use of his parlors in which our convention was held.

Unanimously adopted.

Moved to adjourn, to meet in Dubuque, Iowa, the second Wednesday in May, 1882, 10 A. M.

Correspondence intended for the Guild should be addressed to Joseph Baker, Secretary, Rock Island, Ill.

THE Secretary of the Travelers' Club having gone off on a fishing excursion immediately after the June meeting of the Club, and as he carried with him all the records of the meeting, we are obliged to omit our report of the proceedings of the Club this month. We shall see to it, however, that the Secretary is properly fitted for depriving our readers of their monthly treat. In reply to several communications received, we desire to say in this connection that all travelers for jewelry houses are eligible to membership, and that the Club invites contributions from all. These contributions are expected to be in the nature of stories, anecdotes, adventures, etc., personal to themselves or others connected with the trade. Communications may be sent in the care of THE JEWELERS' CIRCULAR.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the exclusive official paper of the Jewelers' League, and has been selected for the publication of all matters of interest relating to it. We therefore devote this column to the interests of the League and its membership. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will be herein answered. Address *Jewelers' League*, Box 4001, P. O. New York, or the office of THE CIRCULAR.

We have frequent inquiries by subscribers "what is the Jewelers' League of which I hear so much talk? What are the purposes of the institution?" &c., &c. We have been so much interested in giving the details from time to time that we may have overlooked the necessity of stating the broad general plan of the League, and we will therefore repeat that it is an organization, the main purpose of which is to pay a fund to the families of its deceased members, by a voluntary contribution from each member. While it is not a life insurance company, it gives the principal advantages of the same at much less expense to the members. It pays no soliciting agents, no dividends to stockholders, erects no buildings, pays no office rent, and pays no officer except the Financial Secretary, who is held under sufficient bonds for the security of all moneys intrusted to his care. It was incorporated Nov. 24th, 1877, and has steadily grown until its membership is now over one thousand three hundred men. The membership comprises members of the most prominent firms in the jewelry and kindred trades, as well as their employees, and the officers have been selected for their ability and unselfish devotion to the interests of the League. The careful management of its business in the past is evidence of what will be done by them in the future. Any man between 21 and 45 years of age, who has been in the jewelry or kindred trades for one year immediately prior to his application, and who is in good general health, and recommended by a member of the League, is eligible for membership. Candidates for admission make application with physician's certificate of good health upon forms prescribed and furnished by the Secretary, and are to be recommended by a member of the League. The application must be accompanied by \$5, (\$3 for entrance fee and \$2 for an assessment in advance), and this sum will be returned if the applicant is not accepted. Applicants who reside in, or whose business is in New York City or Brooklyn, are required to be examined by the Surgeon of the League.

The Executive Committee have for several months had under consideration the matter of appointing examining surgeons for the League in all the large cities of the United States.

At the last annual meeting provision was made for the reception and safe keeping of such sums as might be presented to the League by its members or others, such funds to be invested, the principal to remain untouched, but the interest thereon to be applied to reduce the frequency of assessments for death-losses, and thereby to cheapen the benefit to be obtained by the widows and orphans of the clerks, artisans, salesmen and others in the trade.

"Well to do," "comfortably fixed" members of the trade, and all who can afford it, please remember the old French proverb, "Water runs to the river;" the more frequent and the larger your donations to the permanent fund, the more rapidly will it draw to itself the sums which will increase it to an amount, the income of which will be of appreciable benefit to the families of deceased members. The trustees of the fund will gratefully receive any sums which may be sent to the Secretary, and the receipt will be acknowledged in this column. We propose at a future time to show what has been done for the Bank Clerk's Association by those who, from philanthropic motives, interested themselves in it by donating large and small sums of money; and what has been done for it may be done for the League to assist it in its beneficent work.

At the regular meeting held June 3d, the following 61 members were admitted:

Nicholas Schwarz, Frank H. Dana, Victor Weichmann, Samuel B.

Mann, Joseph Girard, Julius Koch, E. Aug. Neresheimer, Harry J. Oppenheimer, Henry S. Herzog, Louis Herzog, Leonard Krower, Wm. Russell, Joseph W. Beacham, Abraham Unkes, New York City; Wm. Weber, Louis S. Tissot, George J. Landes, Jules C. Karr, Eugene H. Karr, Gustave G. Hatter, Francis H. Gallagher, George L. Chabot, Brooklyn, N. Y.; Adalbert J. Warner, Joseph Steffek, John Levin, Chicago, Ill.; Fred H. Corthill, Frank A. Schaller, Willard H. Seeley, Chas. L. Young, Elgin, Ill.; W. W. Wattles, John O. Slemmons, David P. Hoyle, William F. Hoffman, Pittsburg, Pa.; John Thersher, Allegheny City, Pa.; Paul H. Rosenthal, Philadelphia, Pa.; John Fisher, White Haven, Pa.; Frank A. Curtis, Coharnton, Pa.; James R. McIlvried, Marcus Marks, Cleveland, Ohio; Alvah F. Wait, Dwight A. Dewry, Ravenna, Ohio; LeRoy Decker, Marysville, Ohio; James E. DeCoff, Herbert S. Lane, Taunton, Mass.; Ira Richards, Martin H. Brown, North Attleboro, Mass.; Ower DeWitt Rist, Hartford, Conn.; George Frantz, William Frantz, Henry Opitz, New Orleans, La.; Chas. C. Budd, Valparaiso, Ind.; S. H. Bailey, Providence, R. I.; Julius G. Schuman, Richmond, Va.; Jacob Son, St. Louis, Mo.; William T. Vogler, Salem, N. C.; James B. Trickey, Lincoln, Neb.; Emanuel Miller, Montgomery, Ala.; Morgan F. Lewis, Helena, Montana; Alonzo R. Knights, Dubuque, Iowa; Benjamin Guider, Vicksburg, Miss.; Spencer H. Fuller, Lewiston, Maine.

One application was rejected and seven were laid over for further consideration.

The amount in the General Fund is now \$2,975.81, and in the Benefit Fund, subject to the order of the beneficiary of the next deceased member, \$2,498.55.

We notice among the members of the New York Jewelers' Club and the Providence Jewelers' Club, the names of Frank H. Bliss, Henry J. King, Geo. N. Fenn, Geo. W. Parks, J. T. Scott, Jr., Frank H. Bliss, Vice President, and C. D. Marsh, President of the former Club, and Frank T. Pearce and Charles E. Millin, members of the latter, all of them members of the League. We approve of the out-door sports in which these two clubs propose to indulge on July 6th, as being productive of longevity, but we warn the gentlemen who propose to indulge in base ball that the League does not provide relief in case of dislocated or broken thumbs and fingers.

James W. Todd showed a remarkably good record in the match recently shot for the long range championship of rifle shooting. Mr. Todd is one of the early members of the League, and his outdoor exercise will doubtless cause him to live and pay his assessments for many years.

We have received a pleasant letter from C. R. Talcott, of Olympia, Washington Territory, whose membership number is 1,250, half way the limit of membership. It is replete with warm, brotherly sentiments, and promises new members from the Pacific Coast.

IN reference to the bluing of steel parts and screws, Hermann Grosch says: What an eyesore it is to see in a lately repaired watch, its screws, if old, broken, disfigured and scratched; or, if newly put in, each one has its own distinctive color, and all of them representing all the hues of the rainbow, and more too, while it is so easy to give them all a uniform attractive color. Having hardened the head, it is ground clean, then polished with a zinc file and red and plenty of oil, so as not to leave the file dry at any part; it is next washed in soap and water, and put into alcohol, or, without washing, into benzine; when taking it out, be careful not to have any grease adhering to it; next, put it on the bluing plate with brass filings, or on a brass plate, and let it turn blue, and watch to withdraw it at the proper time. Ever let the repairer remember to put no soft screws into a watch; where he sees one, let him withdraw and harden it, especially the small screws in the stopwork, bridges, etc. Excusable only is a soft screw for the clickspring in Swiss watches; because if it should accidentally be broken, its removal might occasion much difficulty. Beside this one, harden all other screws, and save yourself much future annoyance.

The Jewelers' Guild and the State Association.

To the Editor of the Jewelers' Circular:

It may be that there are some of your readers who do not understand exactly how the jewelers' societies are organized and what they are striving for; a few words of explanation may not be out of place. There are in the states of Illinois, Iowa, Wisconsin, Michigan, Minnesota, Kansas, Nebraska, and Indiana, associations formed by the combination of retail jewelers. These associations have a representative in the "senate" or "grand lodge," which is called the Watchmakers' and Jewelers' Guild of the United States. The different State Associations have annual or semi-annual meetings at designated points, where such business as properly comes under its jurisdiction is attended to. The Guild meets once every year, and consists of its own officers and delegates from the different state organizations. A very small amount of money contributed by each and every member suffices to keep the societies in efficient working condition, as there are no salaries paid except to the secretaries. It is a little over two years since the formation of these societies; they have already demonstrated their power, and have repaid a hundred fold all trouble and expense incurred. The object of these societies is the same in every state, and may be briefly stated as follows: "To place the retail jewelry business in the hands of the retail jewelers; to educate watchmakers and jewelers in the best and quickest methods of work; to bring about a better feeling among members of the retail trade, and establish a uniform price for work."

There is no one thing that will contribute more toward placing the retail trade upon a sound financial footing than the very movement now developing all over the land. With fair prices, fair work, and a fair profit upon goods sold, the retail jewelers will not always be rated below the shoemaker, tailor, milliner and dressmaker, as he now is, generally speaking. Every retail jeweler in the land ought to belong to these societies; it is his duty; a duty that he owes to himself; a duty he owes to his family. Why does he hesitate? Is he so much more intelligent than his brother watchmakers, that he can learn nothing by contact with them? Is he so rich that he has no use for more money? Is he like some of those enterprising (!) Chicago jobbers, "so full of business that he has no time to attend to matters of importance?" One of these Chicago jobbers replied to one of our Secretaries, upon receipt of a letter asking about some of his crooked transactions, "I am too busy filling orders to attend to it; I do not care whether it is true or not." Some months after, the same Chicago jobber found time to write to the Secretary, and ask what he should do to get off the "black list," and regain the trade that had left him.

I would ask the retail jewelers of our country if we are not men, and have we not blood in our veins and brains in our heads? Let us then have the nerve to demand our rights, and go to work systematically to obtain them. If jewelers in states where there are no organizations will write to either of the State Secretaries, they can obtain all needful information about formation of societies, and a copy of the constitution and by-laws of existing societies.

COUNTRY JEWELER.

IN the case of robbery at Chicago of the trunk of Mr. Morrow, traveler for Ernest Thoma, for which Charles Aldrich and Emanuel Isaacs were arrested, the trial has just been concluded. These men were jointly indicted for robbery, and their prosecution has been conducted under the direction of the Jewelers' Union. Strenuous efforts were made by politicians and others of Chicago, to prevent their being brought to trial, and they were finally defended by four of the best criminal lawyers in the state of Illinois. It is a matter of wonder where the money for their defense came from, but it is supposed to have been contributed by the politicians, gamblers, and pawnbrokers of the city, many of whom eagerly watched the trial throughout. After eleven days legal struggle, a verdict of guilty was rendered against the prisoners, the jury recommending imprisonment for one year. It is understood that nine of them stood out for a more

severe sentence. The prosecution was ably conducted by the District attorney, L. L. Mills, who greatly enhanced his reputation by the adroitness he displayed in managing the case, and by his eloquence in addressing the jury. In recognition of his earnest and vigorous efforts in the interests of the people, to secure the conviction of these prisoners, and for which he received no special compensation, the Jewelers' Union, through Wm. R. Alling, its president, forwarded to Mr. Mills an elegant gold chain, accompanied by a letter expressing an appreciation of his efforts which the Union entertained. A similar letter was forwarded to the chief of police of Chicago, recognizing the excellent service rendered by him in the interests of justice.

THERE are in use between Albany and New York thirteen electric clocks, two of the number being placed in the waiting rooms, and one in the dispatcher's office at the Grand Central Depot, New York. The time on the clock at the depot at East Albany corresponds exactly with the time in New York. Each one of the clocks is connected with the general superintendent's office in New York, in which the railroad time is kept on what is called the "big clock." Conductors, train men, and others, are compelled to keep their watches in strict conformity with the superintendent's clock. It is set by standard time, and connected with the time service department of the gold and stock telegraph. The time is distributed all over the line each weekday, as follows: At 10 o'clock 58 minutes and 3 seconds A. M., the word "time" is sent by the main office to the telegraph stations between New York and Albany. This word is repeated for 28 seconds, during which time operators must see that their instruments are adjusted. At 10 o'clock 28 minutes and 50 seconds, seconds commence beating, and continue for 50 seconds. The word "switch" is then sent over the wire, and operators having electric clocks connect them immediately with the circuit known as No. 9 wire. Ten seconds are allowed in which to make the connection. At 11 A. M., with one touch of the New York key, the hands on the different clocks are set to 11 o'clock.

A short time since an Italian bootblack, walking through John street, picked up a small paper parcel containing, as he supposed, some small pieces of cut glass. He showed them to Mr. E. S. Johnson, the well known gold pen manufacturer, who saw at once that they were diamonds, and took possession of them, rewarding the boy for his trouble, knowing they belonged to some of his neighbors. He immediately advertised them, and was astonished to learn how many people in this city had recently lost a package of diamonds. Claimants were numerous, representing all classes of humanity, from respectable diamond importers, through the whole range of sports, gamblers and thieves, to the common tramp, minus coat, collar, shirt, and an entire stranger to soap and water. Finally the rightful owners presented themselves, proved their property to the satisfaction of the custodian, and received the goods intact. The boy who originally found them was not forgotten, but departed with money enough to buy a whole state legislature.

A large dealer in jewelry on the Pacific coast recently addressed a circular to the leading manufacturers of gold chain in this city, in which he says: "Unscrupulous parties have been palming off 8 k. chains for 10 k., and 12 k. for 14 k., indulging meanwhile in similar transactions in watch cases, and some retail dealers led this by putting a 14 k. swivel to a 10 k. chain and selling the whole as 14 k. goods." The writer suggests that the manufacturers stamp one link of every 14 k. vest chain, and the ring of all guard chains, and thus put a stop to this disreputable business. Something should be done to prevent these unscrupulous men from imposing upon the public in the manner mentioned. It is robbery, and nothing less, and should subject the perpetrator to criminal prosecution. While they continue their nefarious business, respectable jobbers cannot compete, and the public is swindled in a most outrageous manner.

Events of the Month.

DURING the past month, the one in which, according to Mother Shipton's prophesy, the world was to come to an end, was replete with startling events. In the first place, the weather was extremely cold and disagreeably damp for June; next, another body of Morgan was discovered by the anti-masons, which makes the twenty-sixth. This is remarkable from the fact that none of Morgan's bodies have been found before in twenty-five years. Another remarkable fact is that no new watch company was started during the month. Can it be that our old friend, Aristarchus Plumbago, has departed this life? A sudden movement in real estate in California is said to have caused all the pendulum clocks to suspend operations, and set all the watches ten minutes ahead, leaving a strong smell of sulphur behind, which reminded one of Chicago. Comet hunters have succeeded in bagging a new comet, but as yet are in doubt whether it is going to fall upon and smash the earth, or run into the sun and be itself-snuffed out. Few persons who are not habitual astronomers can form any idea of the fierce joy with which the comet hunter stalks his prey among the fixed stars or through the dense celestial underbrush of the Milky way, and finally brings it down with his trusty refractor and triumphantly makes himself master of its elements. It is a fine, wholesome, out-of-door sport, this comet-hunting, but when a large comet suddenly turns at bay and begins to hunt the astronomers, the sport loses, at once, the whole of its previous charm. The particular comet in question was run down by about twenty first discoverers, all of whom are claiming the prize offered by a Rochester gentleman for the discovery. At present it looks as though a coroner's inquest will have to be summoned to ascertain who did the deed. And now comes the information that three young men, well known in the jewelry trade, have returned from a fishing excursion in Canada with the most extraordinary fish stories ever told by truthful fishermen. Their vivid imaginations range through the wild and beautiful scenery of the interior regions of Canada, embrace charming Indian maidens on the banks of rippling streams, revel in descriptions of Lake trout weighing a ton, and brook trout longer than a telegraph pole; also of extortionate charges for riding on locomotives; and one swears he hooked a trout bigger than the bottom of the lake, and broke his pole in the effort to land him; they anathematize the festive black flies that nestled in their bosoms, and aver that Canadian mosquitoes are big enough to give milk. These young men are noted for their modesty, and their veracity is unquestioned. All these doleful and festive items have an important bearing on the watch and jewelry business. The moral of which lies in their application.

Industrial Secrets.

A century ago what a man discovered in the arts he concealed. Workmen were put upon oath never to reveal the process used by their employers. Doors were kept closed, artisans going out were searched, visitors were rigorously excluded from admission, and false operations blinded the workmen themselves. The mysteries of every craft were hedged in by thick-set fences of empirical pretensions and judicial affirmation. The royal manufactories of porcelain, for example, were carried on in Europe with a spirit of jealous exclusiveness. His Majesty of Saxony was especially circumspect. Not content with the oath of secrecy imposed upon his workpeople, he would not abate his kingly suspicion in favor of a brother monarch. Neither king nor king's delegate might enter the tabooed walls of Meissen. What is erroneously called the Dresden porcelain—that exquisite pottery of which the world has never seen its like—was produced for two hundred years by a process so secret that neither the bribery of princes nor the garrulity of operatives revealed it. Other discoveries have been less successfully guarded, fortunately for the world. The manufacture of tinware in England originated in a stolen secret. Few readers need be informed that tinware is simply thin iron plated with tin by being dipped into the molten metal. In theory it is an easy matter to clean the surface of iron, dip it into a

bath of boiling tin, remove it enveloped with a silvery metal to a place of cooling. In practice, however, the process is one of the most difficult in the arts. It was discovered in Holland, and guarded from publicity with the utmost vigilance for more than half a century. England tried in vain to discover the secret, until James Sherman, a Cornish miner, insinuated himself master of the secret, and brought it home. The secret of manufacturing cast steel was also stealthily obtained, and is now within the reach of all artisans.

The Insulation of Electric Light Wires.

AT a recent meeting of the New York Board of Fire Insurance Underwriters, the danger arising from the use of electric lights with uninsulated conductors came up for discussion. The matter had been investigated on account of an accident a short time ago in a jewelry store in Maiden Lane, when a man was on the roof running an electric light wire across. In came in contact with the telephone wire, and a flash passed down to the telephone box, destroying it. The shock loosened a considerable extent of plaster, and greatly astonished the occupants of the building, who imagined that the comet had fallen through the roof.

City Electrician Smith said that the shock must, he thought, have been very powerful, and had anyone been at the telephone, he might have been killed; or if the flame had passed near light goods, there might have been a conflagration. The wires of the electric light ought to be thoroughly insulated.

Superintendent Harrison of the New York Board of Fire Insurance Underwriters, said that the Board would ask the proper authorities to see that the electric wires were properly insulated. Owing to the rapid introduction of the light, and the many wires that were being run over the city houses, the danger, he said, was constantly increasing. In the meantime buildings using the electric light would be rated as "specially hazardous," unless the insulation of the wires was approved.

A. A. Hayes, Jr., of the Brush Electric Lighting Company, has informed the board that the wires of that company were already insulated while the matter was under discussion; and since the action of the Board, the other companies have been experimenting in regard to the best method of insulation.

PHILADELPHIA has recently adopted a time ball similar to that used in this city. The automatic apparatus for dropping the time ball at noon was devised by the builder of the clock, Mr. G. W. Russell, the city time keeper. To a delicate hair trigger the armature of a magnet is attached, so that when the electric current is passed through the magnet, the movement of the armature sets off the trigger and lets the ball drop.

The current is sent to the magnet in a very simple manner. In the clock are three wheels, one of which revolves but once in twenty-four hours, the other one once in one hour, and the other once in a minute. In each of the three wheels is a notch, and, of course, these three notches can be in the same straight line but once in twenty-four hours. This occurs on the completion of the last second before noon, and then a lever attached to the escapement drops into the notches, completes the electric current, and sets off the hair trigger.

The time ball is placed above the clock tower of the Union Insurance Company's new building at Third and Walnut streets, and is visible from a long distance.

Owing to lack of space it was found inexpedient to put the machinery of the clock in the tower, so it was placed in a separate loft and connected with the dial by flexible shafting. This avoids obscuring the skeleton dial by the boxing that would have been necessary with the usual right angle connection. Mr. Russell claims that this is the first application of flexible shafting to tower clocks, and that the result has been satisfactory. The time is taken daily from Washington.

Obituary.

JOSEPH J. ACHESON.

It is with feelings of deep pain that we record the death of Joseph J. Acheson, an old and well known traveler on the road, who died at his residence in Brooklyn, June 25th, after a long and painful illness. Poor Acheson had for many months been sorely afflicted with a cancer, when death released him from his earthly sufferings. The deceased was one of the oldest members of the Jewelers' League, and an earnest worker in its interests. He leaves a wife and little daughter to mourn his loss, and many warm friends deeply sympathize with them in their bereavement.

Views of Correspondents.

This department of *THE JEWELERS' CIRCULAR* is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

AN ABUSE IN PLATED SILVERWARE.

To the Editor of the *Jewelers' Circular*:

THE JEWELERS' CIRCULAR is doing good work—it is a splendid journal—we hope to see it express itself upon what we regard a growing evil in our trade: silver plated ware manufacturers selling their artistic productions to small silver platers who place their lightly plated goods in the hands of unscrupulous retailers. Leading manufacturers selling their productions in metal to small platers in every section of the country, we believe all fair-minded men will regard as unjust to those retailers who ever strive to elevate the public taste, and thereby assist in the advancement of a trade honored throughout the civilized world, for its aesthetic taste and artistic skill. A jeweler commands respect everywhere, and every retailer should always bear it in mind when purchasing goods. The failure of one of our competitors here May 5th, and finding a certain silver plater of Philadelphia as the only silver plated goods creditor on his list, forcibly suggested this letter. The retailer can look to you only for a helping hand. We can buy Messrs. Reed & Barton's, or any other manufacturer's goods in the metal, and plate them here, and injure our competitors' sales, for a time at least; as it would react upon us, but would destroy public confidence in the entire trade. We have battled for the elevation of the trade; we hope you will pardon our usurpation of your valuable time.

G. A. R.

THE WISCONSIN RETAIL JEWELERS' PROTECTIVE ASSOCIATION.

To the Editor *Jewelers' Circular*:

The Wisconsin Retail Jewelers' Association will hold its annual meeting at Madison, Wis., the second Wednesday in July, which will be the 13th. It is hoped the attendance will be large, as matters of interest to the retail trade will come up for discussion, and it desirable that there be a good turnout. The Wisconsin Association has made a splendid record for the short time it has been in existence, and it has tried to do the correct thing for the protection of the retailers. The indiscriminate circulation of illustrated catalogues has nearly ceased, but few complaints being now made of their getting into wrong hands, all of which is mainly due to the influence exerted by the several associations. Some few jobbers still persist in furnishing outside dealers with goods in our line, but the refusal of retail dealers to patronize such jobbers is having the desired effect in bringing them to see the error of their ways. Officers and members of neighboring Associations are cordially invited to meet with us, and any suggestions they may be able to make make calculated to benefit the craft at large will be cheerfully listened to.

Communications from anyone, either manufacturers, jobbers, or retailers from any part of the country are solicited, provided they are intended for the advancement or improvement of the jewelry or kindred trades. All such communications can be addressed to the Secretary, who will bring them before the convention.

Yours respectfully,

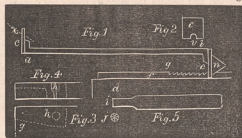
W. H. THORP, Sec. Wis. R. J. P. A.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH.

WORKMEN are frequently required to make new parts of watches and clocks of brass, consequently a few suggestions on this subject must be of interest. It is seldom necessary to cast any part, even for clocks; thick pieces of cast brass are very convenient; the castings can be made from simple patterns of wood, and of such sizes as the following: first, $2\frac{1}{2} \times 1\frac{1}{4} \times \frac{1}{4}$; second, $3 \times 1\frac{1}{4} \times \frac{1}{4}$; third, $3 \times 1\frac{1}{2} \times \frac{1}{4}$; these can be cast of yellow brass if soft metal is wanted, or red brass if harder metal is needed. The yellow brass can also be hardened by hammering on an anvil, when cold, a heavy hammer weighing, say, $1\frac{1}{2}$ or 2 lbs. is best, as it compresses the metal through the entire thickness. The essential instrument to work up or utilize such pieces is a good saw, but the great difficulty is, good saws are hardly to be bought at any price. This makes but

little difference, as saws as good as can be desired are easily and quickly made. To make one, take a piece of French clock spring $\frac{3}{4}$ or $\frac{5}{8}$ of an inch wide, straighten and break off a piece as long as your saw frame will take; this piece needs to be split in the middle, which can readily be done by screwing it lengthwise in your vise, letting one-half protrude above the jaws; commence at one end and break over with a hammer, shifting the piece along as you break it; true up the edge with a flat file so it is true and straight. The object in splitting the piece is to get the thickest part of the spring for the teeth; the first step is a gauge; this is made of a piece of sheet brass $1-16$ of an inch thick and $\frac{3}{8}$ of an inch wide, the ends are bent up as shown at *a*, *b*, *Fig. 1*, in vertical longitudinal section; the pieces *c*, *c*, *Fig. 1* and *z* are of steel, shaped as shown, and should be $1-24$ and $1-32$ of an inch thick; these are hardened and soft soldered on the end of the brass strip as shown at *c*, *Fig. 1*. These pieces, *c*, should be made as hard as fire and water will make them. The object in making one end thicker than the other, is to make finer or coarser teeth in the saw. The mode of using is to screw the piece of spring into the vise as shown at *f*, *Fig. 1*, and with a good three-square file cut the first notch or tooth as shown at *g*, let the notch *v*, (which should be cut obliquely with a small round file in the direction and to the depth indicated at *x*,) of the steel end piece *c*, *Fig. 2*, rest in the notch *g*, and drawing the guide (which is held in the left hand) as far back as the notch or tooth *g* will let it. Let your file rest lightly against it as shown at *n*, *Fig. 1*; with three or four quick strokes of the file you cut another tooth. You do not want the file to press hard against the guide *c*, only let it steady it to start the file right. A little practice will enable you to file a saw in this way with the teeth perfectly even and sharp, and in what you would think an incredible short time. I have often made such saws complete in five minutes. These saws are invaluable for a watchmaker, as the temper is exquisite, and one will last for a long time at an ordinary jobbing bench. Pieces of cast brass as above described, compressed about $\frac{1}{4}$ inch in thickness by hammering, can be fashioned into almost any shape very quickly with such saws, and are especially serviceable in new pieces. Suppose you wish to make a new bridge to a Swiss watch: Take a piece of brass large enough to saw your bridge out of—if you have no brass on hand you can generally get a piece of hard, thick brass from an old worn-out brass rule. No better or harder brass is to be had. Even in small country towns printers have lots of old brass rule which would be serviceable to watchmakers. At *Fig. 3* is shown a piece of brass, the dotted line *p* where it is to be sawn out, *n*, the screw hole. Such a rough general



form is quite accurate enough to commence with. A very serviceable set of tools, (and obviously useful for many other purposes) of 15 or 20 graded sizes, are made from pieces of steel wire as shown at *Fig. 5*; *i* shows the general form, *j* shows the end which is filed into teeth with a three-square file and then hardened; they will need no running down, leave them hard. Drill the hole *h* the size of your screw-head part of the way, then finish drilling the hole with a smaller drill (a little larger than the screw proper); the use of the rose drill *i*, is to bottom out and make the larger part of the hole flat for the screwhead, and of the exact depth of the screwhead. After the bridge is roughed out, screw it fast where it is to go, and with a drill of the exact size, drill through the old steady-pin holes into the new bridge for steady-pins; steady-pins should never show from the top,

and are best made in a lathe; it is hardly necessary to screw them in if the hole is clean and dry, and the pins the same; they will adhere or weld as the pin is twisted or turned in the hole; steady-pins should not be too long nor fit too tight, as a rule for length, three to four diameters of the pin to protrude, and no larger than to prevent side-shake to the bridge when the screw is slack. Next, upright for the pivot hole, either with upright tool or universal lathe. After the jewel is set, file the bridge into shape with a coarse file; single cut six inch files, which can be bought of any hardware dealer for twelve cents is better for such work than the double cut and more expensive imported files. The finish is done with a fine No. 6 Swiss file, a water of Ayre (Scotch) stone is used to remove the scratches; rub the bridge on the stone so the work will be flat; only the top and sides need stoning, except in some very fine watches. Frosting is done by immersing in acid; the details of the process are: with shellac dissolved in alcohol paint over with a small pencil brush, the steady-pins, and lower part of the bridge about the steady-pins; let it dry; sharpen a piece of peg-wood and insert into the screw-hole from the back. Procure some commercial nitric acid (aquaforis)—do not get chemically pure nitric acid, it is worthless for this purpose; keep your acid in a bottle, and when you use it pour two or three ounces into a tumbler; take your bridge on the peg-wood, breathe on it, to cover it with minute globules of water, and immerse it quickly in the acid for a second or two—not more than two. Have a dish of clear water at hand and dip the bridge in, moving it about to rinse off the acid.

After rinsing in the water, the bridge should be dried either with tissue paper or a soft towel, and examined to see if the frosting is deep and rough enough. If not, breathe on it again, and give it another dip in the acid. Sometime three or four immersions will be necessary before sufficient grain is developed. A stiff well-worn brush with chalk and alcohol will polish the surface for gilding. In regard to the gilding, you can do it yourself, or send to any of the gilders advertised in THE CIRCULAR. Ten cents and return postage will pay for gilding a bridge, and fifteen for a mainspring barrel. All the wheels in American watches are frosted by the above process. A Swiss mainspring barrel can be frosted in the same way—with the precaution to protect the center hole and the groove where the cover goes, with shellac, as described for the steady-pins. A barrel frosted and then brushed up with a hard brush and chalk looks very well without gilding, and will do for a cheap job. The frosting of large pieces is done in the factories with scratch brush in a lathe; that is, English and American; the Swiss use a silver amalgam process which requires practice, and besides, the mercury fumes are dangerous. But frosting (for plates) can be done equally as well by acid in the following manner: make a box of thin wood, three inches square and one inch deep; get a piece of India muslin as fine as you can procure—the fineness of the muslin determines the fineness of the grain in the frosting—and glue a piece across the bottom of the box, and thus make a square sieve. Buy an ounce of gum mastic, pulverize it and put it into the sieve; lay down a sheet of foolscap paper, lay your plate to be frosted upon it, face side up. I should have said that the holes in the plate should be protected with shellac as described for a bridge—the jewels, if in free settings, should be removed. Hold your sieve and mastic over the plate, and about half an inch above it; smartly strike the sieve and fine particles of mastic will fall like a snow storm all over the plate; as soon as the surface seems entirely covered, heat the plate over a lamp until it is up to the boiling point of water. This serves to partially liquefy the small particles of mastic so they will adhere to the surface of the plate. A wire loop bent into proper shape and put under the plate serves as a handle to lift it and not disturb the mastic. A thick plate of metal ($\frac{1}{4}$ to $\frac{1}{2}$ inch thick) heated so it will hiss, is a good thing to set the plate on (leaving the wire loop under) to melt the mastic. The plate is immersed in acid as described for a bridge. This process will have to be repeated three or four times to get a fine granulated surface.

The rationale of this process is, the mastic adheres and protects the surface. Keep in mind that you must protect all parts, like holes, which you do not want enlarged, by painting with shellac. Turpentine dissolves the mastic—the mastic must be removed and reapplied before each immersion, and the shellac protection must be kept perfect. The acid needs no dilution and can be used over and over, pouring back in the bottle when through.

Procedure to Render Wood and Tissues Uninflammable.

THE *Société d'encouragement pour l'industrie* had invited answers to the question how to render woodwork and tissues uninflammable. M. Jean Abel Martin proposed the following mixtures, which have been accepted by the Society:

For light tissues—Pure sulphate of ammonia, 8 parts; pure carbonate of ammonia, 2.5; boric acid, 3; pure borax, 2; starch, 2; (or gelatine, 4; or dextrine, 4); water, 100.

For use, steep the tissue in the solution, at a temperature of 30° Reaumur, and saturate it thoroughly; dry it in the ordinary manner as is done with starched articles prior to ironing them. The quantity of starch, dextrose, or gelatine may vary in accordance with the stiffness desired to be imparted to the article. The price amounts to very little—about fifteen centimes per litre, which is enough for about fifteen metres of tissue.

2d. Mixture applicable to decorations already painted, to canvas already mounted, to wood, furniture, window casings, etc. It is applied at a temperature of 55° or 60° R., with a brush, like ordinary paint: chlorhydrate of ammonia, 15 parts; boric acid, 5; skin glue, 50; gelatine, 1; water, 100; lime to give it the requisite consistency.

For canvas already painted, it suffices to give a coating on the back of the painting, and to treat the frames to a like application.

3d. Mixture for coarse cloths, cordages, or straw matings, as well as wood. It is to be applied at a temperature of 100°, and the immersion must last fifteen or twenty minutes; wring lightly, and let dry: chlorhydrate of ammonia, 15 parts; boric acid, 6; borax, 3; water, 100.

4th. Mixture for paper, painted or not. This solution is used at a temperature of 50°: sulphate of ammonia, 3 parts; boric acid, 3; borax, 2; water, 100.

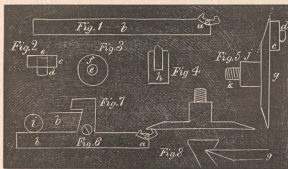
A Japanese Bronze Worker.

THE most skillful living bronze worker in Japan, and one of the most skillful of workers in that metal that Japan has ever possessed, is said by the *Yapau Mail* to be a Kiyoto artisan named Zoroku. His specialty is inlaying with silver and gold, an art which he carries to such perfection that his pieces are scarcely distinguishable from the *chefs-d'œuvre* of the Min period. What one sees on going into his atelier is a very old man—some 65 or 70—peering through a pair of huge horn spectacles at a tiny incense-burner or still tinier flower vase, from whose frets and diapers he is paring away, with marvelous patience, an almost imperceptible roughness or excrescence. Beside him, winter and summer alike, stands a brazier with a slow charcoal fire, over which an iron netting supports one or two bronze vessels similar to that he holds in his hand. Plainly these bronzes are being subjected to a slow process of baking, and if you watch for a moment, marveling at the purpose of a proceeding which seems only calculated to mar the fair surface of the metal, you shall presently see the old man dip a feather into a vessel filled with greenish liquor, and touch the heated bronze here and there with the most delicate and dexterous care. This liquid is acetate of copper, and this patient process, which you see repeated perhaps twenty or thirty times during a visit of twice as many minutes, will be continued in the same untiring fashion for a half a year to come, after which a month's rubbing and polishing will turn out a bronze rich in green and russet tints that might, and indeed must, you would fancy, have been produced by centuries of slowly toiling time.

Gem Engraving.

BY AN EXPERT.

THE writer promised in one of the first articles in this series to give complete instruction for grinding and polishing pallet jewels. The process for this art is so simple and the tools so few, that every watchmaker can afford to practice it; especially when we take into consideration the fact that in a great majority of cases, the old pallets were better adapted for the watch than any new ones we would be likely to get; indeed, the arguments are all in favor of re-jeweling the old pallets. The first and most essential tool is a diamond lap, as shown at Fig. 1, December number, 1880, of THE CIRCULAR. I mentioned in that article that these laps should be beveled on the back, as shown at *p*; the object of this beveling is to allow the lap to go into the angles of the pallets. The instrument for holding the pallets is very simple, as shown at *b*, Fig. 1, and consists of a piece of sheet brass 1-16 of an inch (or a little less) thick, 3-16 wide, and 2½ inches long, with a small screw tapped through one end, as shown at *a*; this screw should be small enough, (No. 14 Swiss plate), so as to go through the staff hole of any set of pallets; it should be hardened and tempered, and work easily, yet have a good thread in the brass, so as to hold the pallets securely, and yet not give out the second time you use it. The next tool is a guide for grinding thin slabs of stone for the pallets; this is made of steel and consists of two pieces, *c* and *d*, Fig. 2. To make it, take a round piece of soft steel, not less than ¼ of an inch thick and ¾ in diameter; drill a hole through it 1-10 of an inch in diameter, turn off the face *f*, so as to



ensure its being at right angles to the hole *e*; fit the plug *d*, to the hole *e*. This plug should be tight enough, so it will require a fair tap with a light hammer to move it. Drive the plug *d* into the hole *e*, and face off the end with a file even with the face *f*. Harden both these pieces as hard as fire and water will make them; after hardening, heat over a lamp to a little above the boiling point, to expel any water from between *c* and *d*; when dry, put on a little oil so it will flow in between *c* and *d*, to prevent the pieces rusting fast, as they are to be used with water. With a punch drive the plug *d* back so as to leave a cavity as shown at *c*, Fig. 2. The stone is most common use for pallets is pale red garnet, and in this article I shall consider such as being used.

Pallets are of two kinds, close, and open or exposed; first I shall describe the process of jewelizing close pallets. Such a pallet is shown in vertical section at Fig. 4; the dotted lines show the rough piece of stone as inserted ready for fitting up. The most convenient form of stone for a new pallet is a garnet cap jewel. Select a good sized one, wet the cavity *c*, Fig. 2, and put in the cap jewel with the wet side down; apply it to the face of the lap wet with water, and in a few seconds the cap jewel will be ground down so the hard steel piece *c* touches the lap all around; this can be told by the feeling, as the piece *c* is held to the lap by the thumb and finger. The cap jewel, now reduced to a thin slab with parallel sides, can be removed and examined, to see if it is thin enough to fit easily into the slot *h*, Fig. 4; if the slab is too thick the plug *d* can be driven in a little by tap-

ping it with the hammer; in this way slabs can be ground of any thickness, with the sides perfectly parallel. After your slab is of the right thickness, if it was made from a large cap jewel, it can be broken into three or four pieces, and each large enough for a pallet stone. The cement for fastening is made of four parts of shellac and one of gum myrrh, melted together and drawn out into threads of different sizes. A piece of such a filament just large enough to lie in the slot *h*, and about twice as long as the pallet is thick, melted in the slot, and the piece of stone pushed in while the pallet is hot, will securely hold it. Next comes the grinding into shape; this is done as follows: put your diamond lap into your lathe, get a bit of large wire which will just go into the hole for the tool rest, have it a little higher than the center of the lathe. We will suppose it is an *in* or entering pallet which we are about to grind; the piece of stone is cemented in as shown at Fig. 4, and the pallets are screwed to the brass strip *b*, by the screw shown at *a*, Fig. 6. At *i* is shown the bit of large wire mentioned above, and now supposed to be screwed into the hole where the tool rest goes; the rest holder is drawn out toward you as far as possible, and the wire *i* is put in line with the face of the diamond lap *g*, as shown (Fig. 6). The steel part of the pallet will serve as a guide to the proper angle. Take the piece of brass *b*, Fig. 1, between the thumb and finger, and hold it flat and horizontal, and apply the pallet to the lap *g*, as shown in Fig. 6; the brass piece should be held on a line with the center of the lathe, one end touching the pinion *i*; the other, which holds the pallets, brings them into contact with the lap *g*; now by moving the piece of wire *i*, either to the right or left, the face of the pallet can be ground to correspond with the steel part of the pallet, thus restoring the pallet stone precisely as it originally was, it is better to adjust the stone to the lap by the pin *i*, than by moving the pallet on the screw *a*. A slight rocking motion of the brass piece *b*, will make the face of the pallet rounding. As soon as the stone is ground down very near to the steel part of the pallet, stop the cutting, slack the screw *a*, and turn the pallets as shown at Fig. 7; repeat the grinding to shape this face of the pallet, using the steel portion of the pallet again as a guide, also moving the pin (or wire) *i* back and forth, to get the angle right.

At Fig. 8 is shown the position of the pallets to grind the inside; this surface need not be polished except for looks. The reader will notice the last few figures are on a larger scale; this was done to make the cuts more distinct. The other, or *out* pallet is done in the same way, except in one case you will have to turn the pallets over as well as shift around on the screw *a*—the idea is to keep the face of the stone to be ground parallel with the sides of the brass piece *b*, and having the pallet stone exposed so as to be readily applied to the lap *g*. You can have three copper laps exactly alike—one charged with diamond dust as I have been speaking of, another to be used with fine emery and water (see Dec. number, 1880); lastly, one for polishing, using rotten stone and water. The emery lap is generally used after the diamond lap, to remove any scratches left by coarse particles of diamond. Here is a point I wish to make plain, as either of the laps (diamond or emery) can be dispensed with. I mean by this that if the diamond lap is charged with very fine particles of diamond, and worn a little by usage, it will leave no scratches which will not quickly polish out. And again, the emery lap can be used to do all the grinding—it does the work well, but is slow when compared to diamond. It is very probable that the ancients used emery exclusively for all their gem cutting, as they knew very little about the diamond, except as a stone called adamant, and one they could do nothing with. The polishing of the faces of the pallets is done with the rotten stone lap and water, using either rotten stone or tripoli; the pallets are held precisely as when grinding, and the pin *i* knocked back and forth so as to bring the face of the pallet to correspond to the lap. Ruby pallets are used almost entirely for open or exposed pallets, and are cut and polished by a different method, as the ruby is too hard to polish with rotten stone, except by using too much time. As far as the durability is concerned a garnet pallet is plenty

good enough, and any discussion on the comparative merits (except the beautiful color of the ruby) of the two stones would be a good deal like the present generation inquiring into the lasting qualities of two building stones, one of which was estimated at 2,500 and the other at 4,000 years. The process of grinding ruby pallets will be given in my next, which will close this series of articles. I consider the process of re-jeweling pallets of so much importance to watch-makers that I have used every effort to make the process plain, and if any reader does not fully understand, inquire of "Expert," through the JEWELERS' CIRCULAR. I will close by saying that twenty minutes is ample time to re-jewel a pallet.

Characteristics and Uses of Aluminum.

BY H. BUSH, HULL.

ALUMINUM is a white metal, of color between that of silver and zinc; is malleable and ductile, but requires repeated annealing during rolling or drawing into wire. Its specific gravity is 2.5 after casting, and becomes condensed to 2.7 after hammering. The melting point is between that of zinc and silver.

This metal, when pure, is not acted on by moist air, or sulphuretted hydrogen, and alloyed with silver or copper will retain polish and color better than pure copper or silver, or alloyed with other metals.

Cold nitric or dilute sulphuric acid have no perceptible action upon it, and but slowly in any of these acids in a heated state, but readily dissolves in concentrated muriatic acid.

The vegetable acids do not affect aluminum, and it is therefore well adapted for culinary or table utensils, for which purpose it is at present advantageously employed by French manufacturers.

The minerals from which the metal is extracted are not only very plentiful, but are more widely distributed than the ones of any other metal; its oxide forms the base of all clays, but is principally obtained from fluor spar, or cryolite, and mixed for extraction with salt and sodium.

The metal was first obtained by Sir Humphrey Davy, but in too an elementary form to be of any use, but Prof. Wohler obtained it for the first time as a gray powder in 1827, and after a series of experiments succeeded in preparing it in metallic particles in the shape of small globules.

For much of the knowledge of the present preparation of the metal, we are indebted to Mons. St. Clair Deville, and his improved process is patented by MM. Rousseau Fieres and M. Paul Morire, and worked by the Societe anonyme de l'Aluminium, in Paris, who sell the metal in bars at 130 francs—\$26 per kilogram—2 lbs. It is melted without any of the ordinary fluxes, and may be poured into the iron ingots for working, or into sand moulds for ornaments.

The difficulty of soldering has hitherto impeded the application of this metal, as the solder cannot be got to run between the joints to be united, unless specially prepared, which, however, may be effected in a very simple manner by fusing some of the solder on each of the joints to be united, and then placing the soldered surfaces close together and exposed to the heat before the blowpipe, when the solders will unite, and the soldering will be effected. After soldering, the articles are placed in sulphuric acid, but not heated.

A good general solder is composed of 4 parts of copper, 5 parts of aluminum, and 90 parts of zinc; the copper is first melted, then the aluminum, with a little tallow added, and the mixture well stirred with an iron rod; then the zinc is carefully added, so as to avoid its oxidation as far as possible.

In the process of working, it requires to be repeatedly annealed, and may under this treatment be rolled to very thin plates or drawn into fine wire. In turning, it is advisable to cover the surface of the metal with a varnish of stearic acid in turpentine, and to dip the

turning tool frequently into spirits of turpentine, which will prevent the tearing up of the metal.

The surface takes a fine polish, and the sheeted metal may be pressed and stamped into any shape.

A novel way of giving the finished article a pleasing appearance is to dip it into a mixture of aqua fortis and fluorine acid, and rinse it well; it assumes not only a uniformly clean, but a bright and slightly frosted surface; the frosting can be increased by an excess of fluorine over the nitric acid.

Aluminum may also be deposited galvanically on any metallic substance in the following manner:

To a saturated solution of common alum is added gradually a saturated solution of sal-ammoniac or spirits of ammonia, which will form a precipitate of alumina. This precipitate is placed on a filter, washed and redissolved in a hot solution of neutral tartrate of potash, and the solution evaporated to dryness and then redissolved in sulphuric acid, and set by for crystallization and the crystals dissolved in water; it is then ready for depositing. No potash or cyanide is used. Any sort of battery may be used, and an anode of a sheet of aluminum or a bag of the above named alumina. The cleaning must not be done with potash or soda, as these substances act on the metal and dissolve it.

The great peculiarity of the metal is its low specific gravity, which specially adapts it for small weights in chemical laboratories; also its extreme sonorosity, for a small bar of the metal, when struck by a hard substance, will give the clear ring of glass.

Aluminum alloys readily with most of the metals, but is practically confined to the admixture with either silver or copper, or both combined; alloyed with a small percentage of silver, it yields an excellent metal for casting small ornamental articles, as it fills the mould well, and retains its lustre better than silver or any other white metal, with the exception of platinum, but is unfit for hammering, as the combination of these two metals makes it brittle; an addition of copper, or the using of silver alloyed with copper somewhat diminishes the brittleness, but impairs its white color.

Equal parts of platinum and fine silver realizes a very superior metal for electro-plating; articles plated with this alloy possess the color and lustre of silver and are not blackened by sulphuretted hydrogen. Alloyed with 90 per cent of copper, it has the color of 18-karat gold, is extremely hard and takes a fine polish; is very malleable and possesses a tenacity equal to that of steel. This alloy is generally termed aluminum-bronze.

Articles made of aluminum or its alloys may be gilded or silver-plated in the same manner as any other metal.

Aluminum is at present extensively employed for nautical, philosophical and optical instruments, for balances of fine scales for weighing small particles in laboratories, and especially for apparatuses and instruments requiring a low specific gravity. For the settings of the lenses in eye-glasses and opera glasses it affords a very pleasing appearance, and its use is contemplated for spectacles and eyeglasses.

The application of aluminum has been suggested as a very useful metal for watchwheels, on account of its lightness, and as a pleasing contrast to the gilded plates and bridges.

In the shape of leaf it is extensively used, and offers special advantages for ornamentings of bookbindings, and all kinds of fancy leather goods, and has for these purposes entirely superseded the application of silver. It is also employed for covering articles of wood or iron which are exposed to wind and weather, such as signboards, palings, ornaments on shop fronts, etc., as it retains its lustre without a covering of varnish far superior to silver. Made into powder, it is specially adapted for bronzing cast iron or zinc goods, and lastly, for pyrotechnical purposes to produce a pale blue color for fireworks. The firm of C. Falk & Co., in Vienna, manufacture a great variety of aluminum goods and products, and have brought this industry to a high degree of perfection.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Eighty-fifth Discussion.—Communicated by the Secretary.

[NOTICE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. Write only on one side of the paper, state the points briefly, mail as early as possible, as it must be received here not later than the eighth day of the month in order to be discussed and reported in the CIRCULAR for the next month.]

HOROLOGICAL LITERATURE IN THE ENGLISH LANGUAGE.

Secretary of Horological Club:

Will the Club please inform me of some good work on watch-making, something that will be of real use to the country watchmaker; something that will tell me just how all parts of the watch should be when right, and especially the escapement. What kind of a work is Saunier's? Is it adapted to the wants of the watch repairers, or is it rather for the manufacturer? I have been waiting and hoping that Excelsior would finish his "Practical Hints on Watch Repairing," and publish them in book form, but as his health has now failed and he is compelled to stop them, I see no hopes of getting them very soon, therefore I make the above inquiry. If the Club will direct me to some good work I shall be greatly obliged.

G. W. H.

Mr. Horologer replied that if our correspondent wanted some single book which would teach the whole art of watch-repairing, he would never find it, for it is impossible to condense that matter into one volume and have it in a style that will be suitable for a country watchmaker, or any other. The variations in principle and construction are very numerous, and the number of possible faults, defects, injuries, etc., is almost indefinite. The most that a single book could undertake to show would be the general principles upon which all horological devices are based, with special descriptions of the more important varieties of timepieces, and then, after the reader has mastered the theory, he will be able to apply his knowledge in practically examining watches, to find out how far they vary from or conform to the construction which they point out as the best. If a workman thoroughly understands the principles of the detached lever escapement, for example, he can examine any escapement of that kind, and perceive what parts are right and what wrong, also what changes should be made to improve or perfect the action.

Saunier's Treatise is such a work as described, and is the most thorough and complete exposition of horology now accessible to the English reader. The cost is \$13, and it should be owned and studied by every workman who wants to really *know* his business. Grossman's Essay on the Detached Lever Escapement is a work of the same order, giving a thorough exposition of the principles of the lever escapement. He believed that the price of the English edition was about \$4. It is also published in French and German at a much lower price. Beckett's "Clocks, Watches, and Bells" is a good general treatise, but rather on the popular order, not going much into principles or details, and is well suited for those who have not the education or desire to study the theory of the art, as given in Saunier's and Grossman's works. Those works are not exclusively theoretical, however, for both are interspersed with practical observations and conclusions.

But, judging from our correspondent's letter, none of these are just what he wants, which appears to be a collection of directions, stating exactly what the shape, distances, adjustments and proportionate sizes of all the parts should be, so that he could apply a measure to them and find out positively whether they are right or wrong, and if not, how they should be. No such book as that is in existence. And such directions or statements, unless they were accompanied by proper explanations, would be as burdensome and useless to a workman as a complete set of unknown tools would be without any instructions in the mode of using them or what they were used for.

Instructions in books may be useless, either from being too exclusively practical, or too theoretical. The desideratum is to combine the two in such manner and proportions as will enable the workman

to understand not only what to do, but why he does it, and what makes the difference between the right and the wrong way. He must have some knowledge of principles as well as of practice, or he is no workman, but a mere mechanical tinker. And the more of the former he has with the latter, the better workman he will be, other things being equal—and the best practical instructions, therefore, are those which combine the practical and theoretical in the best proportions. Probably no writer has ever made a more judicious combination of these two elements than "Excelsior," whose articles are a model worthy of being universally followed by all who write for the practical workman. Any attentive reader who studies his articles on any subject will not only learn what to do and how to do it, but he will have a sound and thorough knowledge of the whole subject, fitting him to work both well and unders'andingly.

Such articles of course require more space than a merely theoretical treatise on the same subject would, and no single volume could hold such instructions on all the branches of the trade. Mr. H. speaks of waiting till Excelsior had "finished" his Practical Hints, but a moment's reflection will show him that there never could come a time when the subject of watch repairing would be "finished," so there would remain nothing more to be written about it. Ours is not a "finished" and stagnant trade, but is continually improving and changing, and he who is now a "good workman" must either keep himself informed on these improvements and changes, or he will soon be left in the rear with with the "botches."

In one sense, then, Practical Hints would never be "finished," but only the articles relating to a certain subject would be completed and another one taken up. Excelsior has in that way finished several subjects. His first series of "Hints" related to the balance and hair-spring, and treated of the adjustments for heat and cold, for positions, for isochronism, and rate, making and fitting hair springs, etc., and included all the finest kinds of work known to the trade, both on watches and chronometers. This series has been re-published in book form by D. H. Hopkinson, Esq., and is sold at \$3.50 per copy. The second series treated of several subjects included in the broad term "examining" watches, from beginning to end, to find every possible fault. Among these subjects were, cleaning watches; examining and correcting the four principal forms of escapements, the cylinder, lever, duplex and chronometer; then came examining, testing, and correcting all the rest of the watch, ending up with the subject of "toothed gearing"—a series of articles which he felt bound to say was the most thorough, complete, and reliable, and the best adapted for the needs of the practical workman, that he had ever seen in any language. If Mr. H. has the back numbers of the CIRCULAR containing those articles, he need look no further, for he may depend upon it there is nothing published that will come nearer to what he wants than those articles. The universal verdict of the trade is that they are unequalled, and we all hope that Excelsior will yet be able to treat other subjects in the same matchless manner.

Horological literature is rather limited in the English language, but there are many other works in the French and German. There is nothing, however, superior to Saunier's writings for the theoretical treatment of horology, and to Excelsior's for the combined theory and practice. Although the latter are called "practical," and are really and thoroughly so, they also convey an amount of information on the principles of the subject that the reader does not realize till he comes to study some theoretical work, when he finds that he is already well grounded in the theory as well as the practice of the subject. As one of his apprentices had remarked of him, "after he had read Excelsior he could understand Saunier, and before he could not."

Every workman should determine to possess all of the works before mentioned—and if he thoroughly masters them, and then keeps up with the current periodical literature of the trade, (in which the JEWELERS' CIRCULAR stands at the head), he may rest satisfied that he is taking the best possible course to prepare himself for the highest positions. None other are worth having. The trade is and long has been overstocked with mediocre and indifferent workmen, but there

is always a demand for really first class men. As the country grows, and becomes more settled and wealthy, this demand will increase. Not everyone can be a first rate workman, but if a man is satisfied that he cannot be at least a really good workman he had better choose some other trade. A degree of mechanical skill which would be very low in a watchmaker, would be sufficient to make a first class engineer, machinist, carpenter, mason, or workman of almost any other kind—and watchmaking is not more profitable than other trades.

These remarks are not designed entirely for Mr. H., but also as a reply to R. W., G. G. N., and other correspondents who have written to us since Excelsior stopped writing, asking when Practical Hints would be republished, if he would go on with his articles, how the articles already written can be obtained, etc. The two first questions we are unable to answer, and in reply to the third we must say that, at present, the only way is to get the back numbers of the CIRCULAR, either from the publisher, or from some workman who is "hard up" and obliged to sell—for no one would be likely to part with them under any other circumstances. The other questions asked have already been answered, and he hoped his remarks would be satisfactory, for he had endeavored to answer all parties fully. There are other works of lesser importance, or treating on some special subject, but they have not been named and explained, for the reason that the workman who obtains those which have been mentioned, will have little need of the others.

THE COMPENSATED BALANCE—ITS FALLACIOUS PRINCIPLE, AND THE IMPOSSIBILITY OF THOROUGHLY CORRECTING ITS DEFECTIVE PERFORMANCE, DEMONSTRATED IN BRIEF.

Secretary of Horological Club:

It is now, and has been, ever since it was discovered that the balance in use to compensate for difference of rate produced by varied temperature does not compensate in regular ratio for such variations, the object of inventors to remedy this defect, for which many devices have been used with more or less success. My object is to point out the causes of the intractability of this balance. The minor of these is, that the metals required to be used do not expand and contract to the same extent between an equal variation of temperature, on being subjected to the same variation at different times. Experiments lead to the conclusion that the cause of this variation is to be found in the time elapsing between the changes, and the regularity of the increase and decrease of temperature in a given time. The other and main cause is that the device employed to effect the compensation is not correct in principle. We have in the gridiron pendulum a device that will enable us to obtain absolute compensation, when proper care is taken in its construction, and correct calculations are made of the length of rod required, after testing their relative expansion. That it is possible to construct a balance that will compensate for variations in temperature with the same precision as the gridiron pendulum, should not be doubted; but that the error of the balance in use cannot be corrected satisfactorily, I will endeavor to demonstrate to the earnest investigator, without too many details.

In our balance we have a straight bar, supported in the center, which is the primary cause of error; that requires compensation, and this should be effected in direct opposition to and at the same ratio that the bar expands. The means employed to correct the expansion of this bar is a semi-circular band, composed of two metals of different expansion, attached to each extremity of the bar. The motion of the band produced by this arrangement, is not a regular one, but one that multiplies at every degree of change of temperature by the figure of the difference of expansion of the two metals. It is therefore impossible to compensate the expansion of the bar with this device, not only in the manner as generally applied to the end of the bar, but in no other manner that has been tried, or that can be suggested. And holding strictly to theory, the claim that it will compensate at two different temperatures, but not at the intermediates and extremes of these temperatures, cannot be accepted as correct theory, whatever its practical performance may be. Its strict theoretical action is that the band will contract more than the bar expands,

or *vice versa*, by which a mere reversal of rate is produced, which in extreme temperatures creates a greater error than a plain balance. Sufficient proof of this may be obtained without any elaborate appliances, by subjecting an old balance to extreme heat, and comparing the expansion of one-half the length of the bar with the vibration of the band, using any rude measurement.

To correct this error, no device in the shape of an auxiliary has yet been made, nor is it probable that by adding corrective appliances to this fallacious device, perfection can be obtained; a more grateful field for success seems to exist in the direction of a new principle; but no new device should receive any attention, unless mathematically correct. And, whatever discrepancies may present themselves, a device calculated to work on correct principles can certainly be corrected sooner than our sore spot, the compensated balance.

CAMPANA.

Mr. Clerkenwell said that our correspondent was evidently on the wrong track in his theory of the compensation balance. He attributes the error produced by changes of temperature to the expansion and contraction of the center-bar of the balance, and supposes that the bi-metallic rim is provided for the purpose of compensating that error. But the fact is that the expansion of the balance itself causes but a fraction of the error. Taking a balance of the usual size, its expansion from the center to the outside, for *fifty degrees change* of temperature, would be less than the one-tenth thousandth part of an inch—which he will himself see would be a small matter. In fact, some writers pay very little regard to the diametrical expansion of the balance itself, but only to the effect of changes of temperature upon the hairspring, which is calculated to be about ten times as great as the effect of the same changes upon the balance. Heat at the same time increases the length of the hairspring, and diminishes its elasticity, and it is mainly to correct the error caused by those changes that the expansion balance is designed—the actual expansion of the balance being a comparatively small matter, and is included with the other minor irregularities which the practical adjustment of the compensation endeavors to allow for.

There are other points in his letter which we could take an exception to, but it is not necessary, as the whole argument falls when the fundamental proposition is shown to be erroneous. Our friend should procure Excelsior's book, (which can be had at the office of the CIRCULAR,) and he will there find in plain language a practical description of the causes of the error, the remedy, the nature and objects of the compensation for heat and cold, and the methods employed by practical workmen to adjust the compensation as perfectly as may be done. The connection of the compensation for heat and cold with the adjustments for isochronism, positions and rate is shown, and how to effect those adjustments, either singly or all together. That is of course only a small part of the book, but if it contained no more than that it would be well worth its price to any workman. After carefully reading it, he thought our correspondent would have an entirely different idea about the compensation balance. But the fact that he had formed any theory about the matter, whether right or wrong, showed that he had the right spirit. What watchmakers need, more than almost anything else, is the power to *think*, to reason from cause to effect, to trace out and detect the cause of an error, and then to study out the proper remedy therefor. Our ideas will often get wrong at first, but the disposition and the method are the correct ones. As practice gives us power to philosophize more correctly, and study and observation gives us a more thorough knowledge of the facts and forces involved, we shall become better and more successful workmen. Everyone should cultivate the habit of thinking and reasoning about his work. He, only, deserves the name of workman, whose operations are dictated by an understanding of the facts, and good judgment regarding the course to be pursued. But he who works by the rule-of-thumb, or on the cut-and-try principle, is, and of necessity must be, a mere tinker. He can only *experiment* with a watch, in the hope of accidentally hitting the right spot, and with almost a certainty of ruining it in the process, even if he does at last "hit it." The workman should not experiment with it, but think. Thought and study are the secrets of success. Our correspondent is evidently a thinker, and that is the

class we like to hear from. After *Campana* has carefully read Escorial's writings about the balance, we should be pleased to hear from him again, and learn his ideas then.

TRANSPARENT CLOCK DIALS

Secretary of Horological Club:

Please inform me where I can get a transparent dial for a window clock, about twelve inches in diameter. Yours truly, R. H.

Mr. Clerkenwell replied that our correspondent's question was rather indefinite, but he inferred that he wanted it as a sort of sign, and thought he would be likely to be suited by the Asbury Glass Sign Co., No. 41 Dey Street, this city.

GRADY'S SOLDERING TOOL.

Mr. Blowpipe exhibited a new tool, sent in by Mr. L. G. Grady, of Halifax, N. C., designed for soldering articles while soldering. It consists of a bar or piece having an articulated arm at each end, and at the extremity of each arm is a pair of tweezers with a sliding ring over them, to hold them clamped on the piece. If a sleeve button is to be soldered, one part is grasped by each pair of tweezers, then the articulated arms are moved so as to bring the two parts of the button together, and hold them in the proper position—the friction of the joints being sufficient to retain them in any position. The whole may then be held by means of the center bar, and moved in any direction without disturbing the relative positions of the two parts of the button. Repairers who practice holding pieces together by hand, know that the tweezers often get so hot that they can hold them no longer, just as the solder gets ready to flow. So they drop "the blasted thing," blow their fingers awful, and try it over again. All such will appreciate this little tool, which holds the pieces automatically, and the handle or center bar is perfectly cool. By means of the joints the tweezers can be turned in any desired position to each other. And if desired another articulated arm with its tweezers can be added, so as to hold three pieces at once. It is an ingenious and handy little tool for the jobber, and can probably be obtained by addressing the patentee at the address before mentioned.

CLEANING MAINSPRINGS—POLISHING LATHE—SOFT CASE-SPRING SCREWS.

Secretary of Horological Club:

Will your honorable body have the kindness to give, in detail, the latest, best, and most scientific *modus operandi* of removing a mainspring from the barrel, cleaning it at, and returning it after cleaned? 2d. The dimensions and weights of a good, the best polishing lathe, for the general repairer? 3d. Why, and how, do the manufacturers of screws sent out with some patent case springs make them to approach so very near to lead in softness. I. S.

Mr. McFuzee replied that with regard to the first point, there were many ways—some good workmen preferring one, some another. As to which is "the best," that is entirely a matter of opinion, and every one had as good a right to his opinion as others had to theirs. A good way to remove an English lever mainspring is to take out the head of the barrel, clasp the arbor square in the sliding tongs, and turn it to wind up the spring a little, take the pressure off the outside coil, so that the hook could be pushed out of the hole with the peg-wood, then pull the spring out of the barrel in the usual way. Any other kinds of springs that are liable to stick at the hook, should first be loosened there, before pulling the spring out. Of course the fingers must rest over the open end of the barrel while doing this, to prevent the spring twisting up edge-wise and jumping out in a "snarl." Such an accident not only bends the spring, but is liable to strain and break it, besides the trouble of getting it unsnarled. Springs which are free on the bottom can have two or three of the central coils gently lifted up and rested over the others, raising up more with the tweezers till the whole jumps out. Some do this with all sorts of springs—but it is safer to loosen the outer end when there is any danger of sticking the hook.

When out, the spring is thrown into a dish of 98 per cent. alcohol, to dissolve the grease, while the watch is being cleaned, after which a soft brush will remove any fibres or loose dirt. The barrel may first be wiped out with paper, to remove the bulk of the oil, then put into the alcohol, and finally cleaned like the rest of the movement. The common practice of cleaning mainsprings by wiping them off with a rag, over the whole length, is one that should never be done, for straightens out the spring especially near the center, and makes it liable to snap off when again wound up—either immediately or soon after the watch is set to running. The method of cleaning by alcohol is far better, more perfect, and easier, and cannot injure the spring.

Some workmen use pure benzine instead of alcohol, and that is as good if it is pure—but only benzine that's specially prepared or

selected for watchmakers' use should ever be employed for cleaning purposes, because if the slightest part of it fails to evaporate, and remains on the parts when the watch is put together, it mixes with the new oil, "cuts" it, and the watch is worse off than if running dry.

Many workmen say they have difficulty in getting good benzine. We can only advise you to buy benzine only from some reliable material dealers, and require them to *guarantee* that it has been prepared for watchmakers' use. If they deceive you, don't ask them to pay back the money, but tell them to keep out of your store in future unless they want to be kicked out—and *publish* them for the benefit of other watchmakers. Never deal a dollar's worth with any house that is tricky, that you are afraid to trust, or that is not perfectly square and fair every time—whether in buying benzine or anything else.

While the spring is out, see that its shape is correct, that the hook is sound and fits well, the coils perfectly flat, and everything right. There are different ways to put the spring in the barrel. Some workmen always use the mainspring winder, get the spring wound up in a small flat coil, which they hold tightly in the fingers of one hand, and slip the barrel on over it—letting the spring slip around in it till the outer end comes to its place and is securely fixed. If necessary, turn the crank of the winder till this occurs—holding the fingers over the open end of the barrel while doing so, to press the spring in and keep it flat. When all is secure, let the barrel slip around in the fingers, then gently remove the center of the spring off the arbor of the tool. This arbor must always be of proper size to fit the central coil of the mainspring, without pressing it open and making it larger, and, above all, it must not be *smaller* than the hub of the barrel arbor on which the spring belongs. Many springs are broken in that way—by being cramped around an arbor smaller than they are accustomed to. "Thick springs, like those of English levers, are very liable to snap off when so treated—and when the hook sticks out too far.

Another way to put the spring in is to do all with the fingers. Holding the barrel in one hand, put the outer coil of the spring into it, seeing that the end is properly hooked and fastened in its place, then hold it so with one thumb, while with the other thumb you pull in the next half coil, then hold it there and with the opposite thumb work in another half coil, and so on—the opposite thumbs successively working in a half coil at a time, till all is in. This is a good way with thin and narrow springs, but when they are wide, or very thick, and soft, it is liable to twist the spring out of flat, and make the center stand up. In such cases the former way is better. When the spring is in, always be sure that the center lies flat in the barrel, that the point does not dig into either head, but stands free between them when on the arbor hook—and see that the hook is sound, well shaped, and fits the hole properly, for if the spring slips off when you wind it up, it will probably snap and break. In handling the barrel it is of course held with clean tissue paper, to keep the skin from soiling it.

As for oiling the spring, some say "wipe it off with a greasy rag," but there is the same objection to that as to cleaning the spring with a rag—it does the spring more harm than the oil does it good. Some oil the interior of the barrel with a greasy rag before inserting the spring, and there is no objection to that, as long as the oil is applied afterward. Others put the spring in, and then apply oil around the tops and bottoms of the coils, put in the barrel head and wind up the spring to work the oil in among the different coils. Some put the barrel together, then put in oil at the hole in the edge of the barrel head so long as it is sucked in freely. Many other ways are practiced.

Perhaps "the best" way is to put oil in at the bottoms of the central coils, enough to well oil that end of the barrel after it is distributed by the motion of the spring; also rub enough for a like purpose over the tops of the coils; then oil the top and bottom of the arbor hub, oil the central end of the spring well, and put some on the end of the arbor hook. Be sure there is plenty of oil to lubricate the whole surface of the spring and the whole interior of the barrel, after it becomes spread. But there must not be so much that it will "fry out" at the arbor bearings, or around the barrel hook. Everyone must use his judgment, so as to get on enough oil for properly lubricating the parts in each case, without putting on too much. Then, having wound up the spring, and found both the spring and arbor free and easy, the stop-works correct, and the fibres of the spring remain anywhere on the barrel, and that it is clean and bright, you may consider the job well done.

As regards a polishing lathe, that depends so much on the precise character of the work mostly to be done on it, and the wishes and methods of the user, that the only advice is: know just what you want, then look up the different lathe for sale, (nearly all of them good,) and take the one that suits you best.

Case-spring screws are left soft because it saves the manufacturers the trouble of hardening them. But cheap case-springs and screws are better left alone. They make the workman more trouble and bother than they are worth when done. If you value your reputation and future success, use nothing but good material, of any kind, do a good and substantial job, charge a fair living price for your work, and guarantee it well done. So you will save yourself trouble, satisfy your customers, (all who *can* be satisfied—and they are the only ones worth having,) and build up a permanent and paying business.

HOW TO PIVOT A BALANCE STAFF—HOW TO BECOME A MEMBER OF THE CLUB.

Secretary of Horological Club:

I read the CIRCULAR critically. Now we may all have our peculiar notions of how a job of work should be proceeded with, but I am of the opinion that when a correspondent undertakes to say that such a job should be done so and so, it would be in order for him to give his reasons why. Then we might all benefit by an interchange of ideas. W. S. H. says that in putting a pivot in a staff, it should first be driven out of the balance. I am at a loss to know why, because I never do it. I am convinced that both the staff and balance are liable to sustain more injury by being driven out and put back, than by carefully drawing the temper. If the watch is of so fine a quality that the temper ought not to be drawn, then for the same reason a pivot should not be put in it, but a new staff. In such a case I always turn the rivet off, so that the staff comes out easily without straining the balance.

My way of putting a pivot in a staff or pinion is this, and many years of experience have taught me to be the best. Take a slice of potato, a quarter of an inch or so thick, and another much thinner; place your wheel or balance fairly in the middle of the hole between the two slices, the thin slice on the side in which the pivot is to be put. If it is the lower pivot, blow a jet of gas parallel with the balance. This ought not to alter the temper of the balance. If it is a top pivot, stick a piece of potato on the other pivot, and blow a sharp jet of gas through the hole. The slices of potato must be pressed firmly together and fastened by sticking a few pins obliquely through it. Now cement a brass or ivory collet on with beeswax, place it in the turns, with the broken end of the staff in the new shoulder. See that the balance runs true and flat; you will probably find it all right—if not, make it so before proceeding further. I might say here that I do all this kind of work with the bow and turns, and consider it the only correct way. I have been fooled a few times in doing this kind of a job with a lathe and chuck, and found that when I supposed the job was finished, I have discovered that the end gripped in the chuck, instead of running to its center, had been describing a small circle. Being satisfied that the balance runs true, turn or reduce with a file to the shoulder, whether it be long or short—having previously noticed or gauged the length of it, down to part the spring collet fits on. Find your center as near as you can; it is desirable to get the center, but not absolutely necessary, with the top pivot. Chamfer it out with a piece of hard steel with a three sided point. Put it in the turns, and proceed to drill it with a large drill, and see to it that the old pivot in this and all subsequent operations, runs on a brass center, clean and well oiled, or you may find to your discomfort by the time your job is finished, that it is worn so short as to render the staff useless. I have for several years made my drills of piano wire. It is very soft when annealed, and very strong with a good temper, and is just the proper temper for pivots as you buy it. Try it once and you will never use anything else. Harden your small drills by giving a red heat, and a vigorous shake in the air, large ones by sticking them in a potato, soap, or wax. When hard, clean them by holding them loosely with finger and thumb, resting on a cork in the vice, rub with pumice stone as you would any piece of steel work for a watch. If you use the wire I have recommended, just a tinge of straw color will cut well. Having drilled the hole deep enough, fit your pivot in by filing first, then grinding it in with a little oil stone dust; when fitted well, cut the piece off as long as required to give you room for turning, take a little off the end that goes in the staff with a slip of stone, put your balance and staff in a riveting stake, and drive your pivot with a few light taps of a hammer, moving your job round a bit between each tap. Point the new pivot, and put it in your turns; your balance will now show any deviation from the center. Alter the new staff in the balance runs perfectly true, then proceed to turn the new shoulder and pivot. All this will apply to a wheel and pinion.

Mr. Uhrmacher said that our correspondent's ideas were all good, and as for the piano wire, he himself used it for many purposes, and was well pleased with it. As Mr. M. seems inclined to correspond with the Club, he moved that gentleman be elected an honorary cor-

responding member, and invited to send in communications on subjects pertaining to the trade as often as he could make it convenient to do so. This motion was seconded and unanimously carried. The chairman remarked that we should also be pleased to hear from any others among our readers, at all times, about new and imported tools and attachments, new and different ways of doing particular jobs, trade secrets and "wrinkles," and new ideas on any subjects of interest to the trade. Our desire is to dispense as great an amount of information as possible, and if everyone would occasionally contribute a little, the trouble to each would be very slight, while the aggregate benefit conferred upon the trade would be simply incalculable.

Mr. Uhrmacher suggested that we might offer to elect any watchmaker who would occasionally contribute to our Proceedings valuable items of information, and that we might constitute a new class of members to be called corresponding members, and consisting of out-of-town workmen who will undertake to send us in regularly news items, and become regular correspondents.

Mr. Regulator thought that it would be enough to elect gentlemen honorary corresponding members after they had earned the reward, instead of offering it to all who would *promise* to do so. He thought the proposed change would be rather too radical and sweeping an innovation to be adopted off-hand, and that the subject should be more maturely considered before acting upon it.

This view finally prevailed, after some further discussion, and gentlemen who desire to be enrolled as corresponding members are invited to send in their contributions, with a view to future election as corresponding members.

Alloying and Coloring Gold.

BY G. H. GEE.

From the Goldsmith's Handbook.

CONCLUDED.

Another mixture that may be used to restore high quality gold articles, when their color has deteriorated, in the same manner, consists in the following chemicals:—Sesquioxide of iron, 3 oz.; acetate of copper, 3 oz.; calcined borax, 1 oz.; water to form paste, 2 oz. The acetate of copper should be well dried before using to free it from vinegar, or it will probably corrode the work. In this recipe the sesquioxide of iron should be the red, whereas in the other it may be the yellow. The treatment is exactly the same as that in the one previously described.

As it is difficult to procure, at the time when most wanted, alloys for solders that are the most suitable and advantageous for the various kinds of work without no little inconvenience in effecting a proper composition, we here append a list suitable for all the quantities of colored gold work as manufactured by jewelers and goldsmiths:—

"Gold solder suitable for 18-carat work." Gold, fine, 1 oz.; silver, fine, 7 dwts.; copper wire, 4 dwts. Or 3 dwts. of copper and 1 dwt. of composition instead of all copper.

"Another gold solder suitable for 18-karat work: Gold, fine, 1 oz.; silver, fine, 7 dwts.; copper wire, 5 dwts. 12 grs. Or 4 dwts. of copper and 1½ dwts. of composition instead of all copper.

Gold solder suitable for 16-karat work: Gold, fine, 1 oz.; silver, fine, 8 dwts.; copper wire, 7 dwts. Or 5 dwts. of copper and 2 dwts. of composition instead of all copper.

Gold solder suitable for 15-karat work: Gold, fine, 1 oz.; silver, fine, 10 dwts.; copper wire, 10 dwts. Or 7½ dwts. of copper and 2½ dwts. of composition instead of all copper.

Gold solder suitable for 14-karat work: Gold, fine, 1 oz.; silver, fine, 12 dwts. 12 grs.; copper wire, 12 dwts. 12 grs. Or 9½ dwts. of copper and 3 dwts. of composition instead of all copper.

Gold solder suitable for any colored work: Gold, fine, 1 oz.; silver, fine, 15 dwts.; copper wire, 12 dwts. 12 grs. Or 9½ dwts. of copper and 3 dwts. of composition instead of all copper.

Since so much iron has been used in the trade of late, in the preparation of light hollow work, a few words in reference to the treatment of lemel, or filings arising therefrom, will be most welcome to that circle of the trade. The iron which the lemel contains can never all be got out with the magnet; in the melting of it we have experi-

enced a difficulty in effecting a clear and perfect collection, such as did not present itself in lemel free from iron. We, however, reduced the process to the same simplicity as the former one, by using the following flux in the following manner:

Take lemel, 20 oz.; potash, 1 oz.; salt, 1 oz.; sandever, 1 oz.; salt-petre, 1 oz. Well mix the lemel with half of each of the two former salts and put it into a sufficiently large clay crucible to prevent boiling over when it rises. Put the remaining half of the potash and salt on the top and press it down a little, then place the crucible in a good wind furnace well surrounded with coke, and give it a great heat; when the mass has become liquid through the penetration of the former salts add a portion of the sandever and salt-petre, but only in portions at a time, otherwise the contents of the crucible may rise and pass a part of it away by flowing over the top, and this is to be guarded against. When the whole of the sandever and salt-petre has been added in this way continue the heat for half an hour or so; the crucible should then be withdrawn, allowed to cool, and subsequently broken to recover the lump of gold, etc. The button of gold is then weighed, the difference from its former weight noted, and a final melting in a plumbago pot with a little charcoal flux, and pouring into an ingot mould, would complete the process. The bar of metal is then quite ready for the assay to be taken in order to ascertain the quality of it.

18-karat gold articles, and upwards, from *bright alloys*, can be made to present a beautiful bright mirror-looking appearance by well polishing all over, inside and out, with pumice and emery, then with oil and rottenstone, and finally finishing upon the buff with a little rouge of the best quality and a touch or two of grease. Work high in quality finished in this manner requires no gilding or coloring to put a superior surface to it; and when it is well washed out with soap in a hot solution of potash or soda it looks very beautiful and rich. The bright alloy for 18 karats is composed as follows: Gold, fine, 15 dwts. 3 grs.; silver, fine, 2 dwts. 21 grs.; copper wire, 2 dwts. Add 2 grs. of copper per oz. for loss in melting.

This alloy is for Hall-marking, and the three grains extra of fine gold in the alloy is an allowance for the gold never being bought quite pure, and enable it to pass the Hall in safety. The two grains of copper added for melting loss have found to be an advantage, since it keeps the alloy more uniform as to its original weight, and the cost per ounce is more certain and regular, whilst its safety in passing the Hall is more than guaranteed by its adoption.

When colored gold work intended for coloring has, by accident in mistaking the solder, become soldered with silver solder, which renders it unfit for the process, it can be prepared for it again by placing the work in tolerably strong nitric acid of good commercial quality and free from muriatic acid, as the latter would cause the mixture to be decomposed, with liberation of chlorine and dissolution of the gold. This is therefore to be avoided, in order to prevent the complete destruction of the work when seeking only for the removal of the inferior solder which has been inadvertently applied to its connections. The nitric acid solution, if chemically pure acid is employed, will entirely free the work from all traces of this solder, as the acid will break it up and dissolve it without injuring the articles operated upon in any way. After the solder has been removed and the work taken from the solution or acid, it should be rinsed, annealed, and boiled out in dilute sulphuric acid—commonly called oil of vitriol—before resoldering again with the proper solder. The nitric acid solution should be of a good strength, although not too strong; a good mixture consists of one of acid to four of water. This is convenient strength for effecting the above purpose; it should be used hot, and the necessary degree of heat can be kept up to the point required by means of the gas jet.

Designs of gold articles as now made for the market are of such a delicate make and construction, some of them, that they have to be supported underneath in the process of manufacture with iron wire; charcoal is the best for the purpose, and should be the only kind used, because any other is very difficult to remove. At the finish

of the work this iron has to be removed by dissolving in some acid with which it has great chemical attraction. Sulphuric acid is the best for this purpose; it is sold under the name of oil of vitriol. To dissolve the iron from the work, take a stoneware jar or pipkin large enough for the work in hand, put the work into it, and add sufficient boiling water to well cover the work; the pipkin must not be filled with water, for when the acid is added it will boil over and carry all the liquid away without its being properly utilized. In putting the acid to the water great care should be taken to prevent its flying about, as the scald or burn will destroy everything it comes in contact with. The proper way to add it to the boiling water would be as follows:—Take an ordinary copper boiling-out pan, and firstly put into that receptacle the oil of vitriol, and then take hold of the mouth-piece with a long pair of tongs, and very gradually pour the contents into the pipkin holding the work and the boiling water. When this is done, place the pipkin with its contents in a water bath or on a sand bath, but if these conveniences are not at hand put it upon a sheet of iron with a gas light underneath, which will keep the mixture at a regular temperature. After the expiration of one hour the liquid will require to be poured off, and another addition of hot water and oil of vitriol, as before, made to the work. This should be kept in action a little longer, when a third one is made, and which generally completes the process if all things have been favorable. The strength of solution which acts best is this: to every 8 oz. of boiling water take 1 oz. of oil of vitriol; that would be 5 oz. of oil of vitriol to the quart of boiling water. These proportions refer to when the solution is kept hot by means of the gas jet, and not when the dissolution is allowed to proceed without its action being increased by the aid of applied heat. In the latter case, the dissolving mixture may wisely be used a little stronger. By this process a large quantity of iron may be dissolved without affecting the gold in the least degree. Three hours, with proper attention bestowed upon it, is ample time for removing the iron from a batch of work containing it.

A dead pale lemon color can be given to plain work when the alloy is right by carrying out the following instructions. The work requires to be well polished in order to present a nice surface, after which process it is washed in hot soda water and dried; it is then annealed by placing over a clear fire upon a copper pan. The annealing oxidizes the surface of the work, and thereby renders it the more attackable by the acid employed in the subsequent process. When the work has cooled from the annealing, it is suspended upon a wire and then dipped into boiling dilute nitric acid, free from muriatic acid, when the articles will present a fine rich lemon color.

Most jewelers, at some time or other of their experience, may have met with accidents in the melting and pouring of their alloys. Such, for instance, as a pot cracking, the spilling or the upsetting of a portion of the metal from the crucible into the fire. The following mode of recovery of lost metal we have found the best and most practical in the workshop with the ordinary appliances usually at the command of jewelers and gold workers. Collect the whole of the burnt coke, ashes, and other refuse used in the melting operation, and first of all wash it several times with water, to remove the dust and other extraneous matter; the sediment left behind is then well dried and pounded as fine as possible in a cast iron mortar; it is afterwards put through a sieve as fine as is convenient to prevent the small particles of gold from going through the meshes with the powdered dust. The gold is now picked at this stage from the refuse in the sieve; and if there be any solid particles of refuse still unpounded it is put through the process again. It is very seldom that the whole of the gold can be collected when once spilled into the fire, but the major portion of it can be recovered by these means. The other goes into the sweep to be treated by the refiner.

In carrying out any of these suggestions it is important that the chemicals employed for the purpose should be of the best quality, if not chemically pure, when complete success and good commercial results are desired to be achieved by the adoption of any of the various processes described.

The Discrimination and Artistic Use of Precious Stones.

BY PROFESSOR A. H. CHURCH, F. C. S.

From *The British Horological Journal*.

CONTINUED FROM PAGE 114.

A few lists or tables of the hardness, pleochroism, and specific gravity of some of the more interesting and valuable of precious stones will be useful here. Such tables are more convenient for practical and ready use when arranged in a kind of progressive order, such as I have adopted. The hardness assigned to the different species, or varieties, must be taken as average or approximate only. The terms used to designate the differing colors of the oppositely polarized beams in dichroic stones, are the best I could select, but refer merely to the specimens examined. The table of specific gravities contains a selection from about 200 specific gravities, taken by myself with unusual precautions.

TABLE OF HARDNESS.

Diamond.....	10.0	Loilite.....	7.3
Sapphire.....	9.0	Cinnamon Stone.....	7.0
Ruby.....	8.8	Jadite.....	7.0
Chrysoberyl.....	8.5	Amethyst.....	7.0
Spinel.....	8.0	Jade.....	6.5
Topaz.....	8.0	Peridot.....	5.3
Aquamarine.....	8.0	Moonstone.....	6.3
Emerald.....	7.8	Green Garnet.....	6.0
Zircon.....	7.8	Tourmaline.....	6.0
Tourmaline.....	7.5	Opal.....	6.0
Phenakite.....	7.5	Lapis-lazuli.....	5.0
Almandine.....	7.3		

TABLE OF PLEOCHROIC STONES.

NAME OF STONE.	TWIN COLORS.
SAPPHIRE, blue.....	Blue
RUBY, red.....	Aurora red
TOURMALINE, red.....	Salmon
" brownish red.....	Umber brown
" brown.....	Greenish yellow
" green.....	Pistachio green
EMERALD, green.....	Yellowish green
TOPAZ, sherry.....	Rose pink
PERIDOT, pistachio.....	Sea green
AQUAMARINE, sea green.....	Grey blue
BERYL, pale blue.....	Azure
CHRYSOBERYL.....	Greenish yellow
LOILITE, lavender.....	Indigo blue
AMETHYST, purple.....	Bluish purple
TOURMALINE, blue.....	Indigo blue
	Greenish straw
	Carmine red
	Rose pink
	Columbine red
	Orange brown
	Bluish green
	Straw yellow
	Brown yellow
	Straw white
	Sea green
	Golden brown
	Pale buff
	Reddish purple
	Greenish gray

TABLE OF SPECIFIC GRAVITIES.

Zircon:—	Rose.....	3.631
Iacinth (Espany).....	Puce.....	3.592
Columbine red.....	Aurora red.....	3.599
Green.....	Olivine:—	
Brown.....	Peridot.....	3.389
Red brown.....	Topaz:—	
Brown yellow.....	White.....	3.597
Yellow.....	White.....	3.571
Orange yellow.....	White yellow.....	3.540
Dull green.....	Tourmaline:—	
Garnet:—	Green.....	3.154
Red.....	Black.....	3.124
Yellow green.....	Red.....	3.044
Emerald green.....	Red brown.....	3.009
Pistachio green.....	Beryl:—	
Cinnamon stone.....	Emerald.....	2.704
Cinnamon stone.....	Aquamarine.....	2.702
Sapphire:—	Blue.....	2.701
Yellow.....	Yellow.....	2.697
Yellow.....	Brown yellow.....	2.690
Blue and white.....	Quartz:—	
Chrysoberyl:—	Milky.....	2.642
Golden yellow.....	Pure Rock Crystal.....	2.650
Yellow.....	Brown Cairngorm.....	2.656
Brown yellow.....	Amethyst.....	2.659
Spinel:—	Very dark Amethyst.....	2.662
Indigo.....	Adularia:—	
Indigo.....	Moonstone.....	2.585
Puce.....		

It has been no easy matter to decide upon the order in which the several most important precious stones should be discussed. In a chemical paper a classification in accordance with composition would be absolutely right; while such physical properties as hardness and specific gravity might be made prominent features in the arrangement of the species in a physical paper. But as the ornamental or artistic employment of precious stones conveys primarily, if not wholly and ultimately, an appeal to the eye, it is clear that such optical properties as can be comprised in the terms color, lustre, and light should afford the bases of our classification. On the whole, the prominent feature of precious stones is their color, and the easiest way of considering their color is to adopt the order of succession of the colors in the ordinary rainbow or prismatic spectrum, beginning with the white light from which they all spring.

White Stones.—The diamond naturally takes the first position if we consider its hardness, its remarkable composition, and its strong refraction and dispersion of light. Its properties, so far as they appeal to the eye, differ much from those belonging to the majority of other stones, and it forms, partly in consequence of this peculiarity, as good a border or setting to other jewels as a gold frame does to a picture. Of course much depends upon the quality of the diamond, and much upon the shape which is given to it by the lapidary. The flat plates of *lasque* diamonds, and, in less degree, the step-cut stones with broad tables, exhibit the unique and splendid lustre which is peculiar to the polished surface of this stone; these forms also permit the transparency and the total internal reflection of light to be well seen. Even the form of the diamond crystal, the regular octahedron, when its surfaces are really planes, well exhibits the transparency and reflection of the stone.

This seems the place to raise a protest, which, indeed, I have done on many previous occasions, against the ignorance and narrowness which would condemn diamonds and all other stones, irrespective of all the optical differences which they present, to be cut *en cabochon*, or tallow topped, that is, with a convex rounded surface. A certain clique of artists and amateur writers on art insist upon all stones being cut in this way, which, in the majority of cases, is fatal to the development of those optical qualities upon which the beauty of precious stones mainly depends. Indeed, the faceting of the great majority of transparent stones is not only a necessary operation, but it should be done in strict accordance with certain rules of proportion, which may be deduced from the optical constants of the species of stone operated upon. But with pale and defective specimens, the *cabochon* form is often found more suitable than the rose, or brilliant, or stepcut; and it is the only method of showing to advantage the peculiar beauties of a large number of translucent, chatoyant, or opaque stones, like the chrysoprase, the opal, the moonstone and the cat's-eye.

Next to the diamond, we may place the colorless zircon or jargon, then the phenakite, then the white sapphire, the white topaz, and the white beryl. Rock crystal will come below these in point of brilliancy. The colorless zircon (of which a fine specimen set in a ring may be seen in the British Museum Mineral Gallery, now at South Kensington) approaches very near in prismatic brilliancy to a diamond; so, at night especially, does the rare and curious mineral phenakite. There is, however, always a sort of difficulty in finding an appropriate use for colorless, yet lustrous, stones in any article of jewelry intended for personal adornment. The more lustrous and prismatic they are—the more they resemble the diamond in fact—the less available they are for the usual purpose to which gems are put. Still, there are peculiar qualities in these stones which need not be lost to artistic employment, if the white stones in question were judiciously associated with materials which would prevent their being mistaken for diamonds. A white diamond would rarely or never be bordered by green tourmalines, but these stones would form an agreeable combination with a white zircon, a phenakite, or a white topaz. In the sapphire there is usually a faint suspicion of milkiness, and in the white beryl a cool greyish tint, which prevent these stones from re-

sembling the diamond so closely as to be taken for imitations of that gem. But many of these colorless stones, notably the topaz and rock crystal, in all probability are most appropriately used when set as bosses in vessels, and other large pieces of metal work, or employed in the form of plaques for engraving or etching. It is scarcely necessary to justify such uses of these minerals, and this is not the place to enter upon the question, particularly as it is only by a rather wide use of the term precious that I am able to include these materials, and some others of which I shall have to speak presently, amongst precious stones. Of two other white materials employed in jewelry, the moonstone and the pearl, a few words may be introduced here. The moonstone forms an excellent substitute in many combinations for the pearl, but it does not associate quite so well as the latter with the diamond. With deep-colored amethysts, spinels, and tourmalines, few colorless gems look more refined than the moonstone. But these stones, which fetch a shilling or so apiece only, should always be accurately re-cut and highly re-polished before being used. Their forms are too irregular, and their surfaces too imperfect, as imported from Ceylon, to show off their moonlight sheen with half its intensity, unless they are passed again under a careful lapidary's hands. The improvement thus effected is marvellous. The value of the pearl, whether its "orient" be luminous with prismatic hues, or whether it be a warm, soft white merely, is too well known to be more than named in this connection. But I may be permitted to say one word in deprecation of the extravagant expenditure of time, of ingenuity, and of costly materials, which the attempt to convert large irregular pearls into structures resembling figures has so often caused. The result is nearly always most unhappy.

Red Stones.—The ruby may fitly be considered before other colored stones. It, with the sapphire, and all the transparent varieties of corundum, ranks next to the diamond in hardness. It is, moreover, a stone of great beauty. Probably the experts in jewels are right in assigning the highest value to those rubies which possess a "pigeon's blood" color—this is the orthodox hue. But the paler colors, and those which verge upon pink and crimson, and even violet, are capable of being so treated by means of association with white and black enamel, or with dark stones, like olive-green tourmalines, as to lend themselves to the production of very beautiful decorative effects. The great mistake commonly made in the treatment of the paler rubies, lies in the attempt to treat them in the same way as the deeper colored stones.

It is difficult to describe the peculiar color quality of the ruby in words. In fact, our nomenclature of colors is neither ample nor accurate. Our appreciation of delicate differences between colors is growing, but the language by which we endeavor to describe the hues which we have learned to appreciate is either stationary, or else receives additions from time to time of unsatisfactory words, derived from the caprices of French fashions. The time has really arrived when a standard series of hues of all sorts should be constructed and appropriately named; but, in the case of the ruby, the question of nomenclature comes in, and renders the difficulty of describing the color quality of this stone greater. There is also some prismatic "fire" in the stone, and much internal reflection of light, while its surface lustre lies between resinous and vitreous. These four properties give to the red of the ruby a peculiar richness, which the two other species of precious stones—the spinel and the garnet—which come nearest to it in color, do not equally possess. The two reds which make up the color transmitted by the ruby do not differ much, but yet they help to impart, to a properly cut stone, a delicate variation of hue which is not present in any other red stone, nor in any imitative substance. The dichroism, consequently, never fails to discriminate between the ruby on the one hand and a spinel or garnet on the other. The two latter stones are, of course, softer than the ruby, and the former is always lighter, that is, of less specific gravity. For the ruby, and the whole of the corundum family of stones have the specific gravity of 4, and a hardness which is nearly and in some cases quite 9, on the mineralogical scale.

One of the happiest uses of the ruby is in the form of an inlay, in certain gold vessels of Indian origin. The external surface of these vessels is covered with a system of interlacing ridges and furrows. Thus they are much protected from the chance of dislodgement, while the effect they produce, of a rich deep crimson groundwork over which a gold netting has been thrown, is in perfect harmony with the materials and their workmanship. For, naturally, the metal gold, when pure, or nearly pure, throws a ruddy tint when light is reflected from surface to surface; witness the interior of gilt vessels. The same thing occurs in the golden furrows of which we have spoken, where the rubies seem to rest in a golden sheen, of a hue in which the yellow, and orange, and red elements, now one and now another, appear to prevail. The gold should not be burnished where much contrast between the metallic surfaces and the rubies is desired, but the stones themselves should be as brightly polished as possible, in order not only to develop the full beauty and variety of their color, but also the very considerable surface lustre which the ruby possesses. There is another kind of Indian jewelers' work to which to most of the remarks I have just made apply. A perforated plate or disc of delicate arabesque or radiated work is found decorated with ruby beads, round or oval, attached to the circumference of the ornament, or else introduced into its midst in concentric circles. Here dull, dead, or "matt" gold is particularly appropriate, as affording a pleasant contrast to the rich, smooth, and soft transparency of the rubies, which, from the manner of their mounting, may be looked through. The refinement of the slender goldwork, which, in this class of jewelry, approaches the delicacy of filagree, sets off by its minuteness of detail the simpler and bolder forms of the plain, smooth, rounded stones, which give it color and warmth. I must dwell for a moment or two upon another Eastern method of dealing with the ruby. I refer to the use of this stone as an inlay or onlay—that is, an incrustation—upon jade, both white and green. It is not so much here a beautiful contrast of color that is attained, although the greenish gray or olive green of the jade, enhances the redness of the ruby; but it is a contrast of textures, a contrast of surfaces, a contrast of translucencies. You see but a little way into the jade, though it is illuminated by a soft diffused light; but you see through the clear deep-toned rubies, with their flashing beams of crimson.

Now compare with these examples of the artistic employment of the ruby, the ordinary mode in which this stone is set by English jewelers. Look at the half-hoop ruby ring, with five rubies well matched in color, and graduated exactly in size, set close together in a regular row. You see, perhaps, a little speck of gold appearing here and there at each end of each stone, but nothing is made of these pieces of gold. You accept them because you know they are necessary to hold the stones in their places, but you find neither invention nor beauty in these little bits of gold claws. In fact, they are frequently prepared by the gross, ready for the mounting of any stones, provided the shape of the latter be suitable. Rubies, sapphires, diamonds, garnets and emeralds are all set in the same way, not an attempt being made to adapt the amount of gold surface or its form to the specific nature of each gem. But why should not some variety and some appropriateness of mounting be secured for all stones? How exquisite, and yet how strong, were the gold and enamel settings of precious stones in the Cinquecento time in Italy. Let those patrons who desire the rather barbaric splendor of masses of rubies gratify their taste by means of jewels in which the setting is not seen at all. But surely a fine stone is worthy of a fine and originally designed setting—proportioning the latter in form, in amount of work and surface, and also in color, whether red, or green, or yellow gold, or enamel, to the shape and hue of the stone to be set. And even small stones become quite beautiful, when arranged with taste and judgment, in accordance with the conditions I have named, and with the further condition as to collocation of individual stones in accordance with their size and shape.

(To be continued.)

To Regulate a Watch for Common Use.

BY MORITZ GROSSMANN,

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[Continued from Page 116.]

CHAPTER IV.

REGULATING IN THE DIFFERENT POSITIONS.

The watch, in itself so difficult a construction, since in tenor with its purpose it cannot exceed certain dimensions, is subjected to the additional exaction that it shall preserve a uniformly correct rate in any and all positions. Of what use would the most exact regulating be in a watch placed vertically, if it were to record a difference of several minutes daily, when carried or suspended in a horizontal position? And, in fact, no great inexactness is necessary to produce a minute per day.

If the watchmaker desires to regulate watches in the different positions with anything looking to success, he should first of all acquaint himself with the causes which effect the rate differences. The main disturbance, productive of all the differences in the several positions, is to be found in a *want of equipoise of the balance*. It is insignificant in the horizontal, but creative of glaring errors in the vertical position. Let us assume the equipoise to be of importance, and it will easily be seen that the balance, which should of rights be evenly counterpoised at all points, will partake more of the character of a pendulum, and since its weightier point is not at all times vertical to the earth, it will form a pendulum of an unequal oscillating angle.

The effect produced by an unevenly weighted balance is not by any means the same under all circumstances, even if we imagine, for sake of simplicity, that the weighty part, in a vertical position, hangs downward. The overweight will operate in different ways in the same watch, in accordance with the extent of its balance vibrations.

It will, when the overweight of the balance occurs downward, cause the watch to go slower while hanging, as soon as the vibrations become small. When they increase beyond one circumference, the difference between hanging and lying, by proportions otherwise the same, will decrease noticeably, and with a vibration extent of 440° , or nearly $1\frac{1}{4}$ circumferences, it nearly becomes reduced to zero, and the overweight of the balance, by vibrations of this extent, is nearly without influence upon the rate.

By vibrations extending beyond 440° , the effect of this inequipoise is exerted in a reverse way, that is, the rate in hanging is accelerated by the overweight at a lower point of the balance. Farther on, we will draw deductions from this peculiarity.

Apart from the balance counterpoise, another factor must be considered for the establishing of a regular rate, namely, the pivot friction. If we examine and compare this friction, we will find that it is considerably less in lying than in hanging. When in the latter position, the friction takes place upon the surface of the pivot, consequently upon its largest radius, and under a pressure commensurate with the entire balance weight, while when the watch is in a horizontal position, the balance weight rests upon the more or less rounded pivot end, and nearer to its center, whereby a greatly lessened friction occurs; the occasional gentle touches upon the side walls of the hole almost occur without pressure, and may safely be overlooked as too unimportant.

If it is desired that a watch with a carefully equipoised balance maintain a uniform rate in a horizontal as well as a vertical position, we must endeavor to reduce the friction to a minimum, and to distribute it evenly, for both positions. We first must seek to reduce it as much as possible by examining if the sides of the balance holes are carefully rounded, that they may touch the pivot on only one place, and next, if the polish of these holes is faultless. If any objections whatever consist in these directions, it is utterly useless to attempt a regulating.

He who has the opportunity should endeavor to acquire the faculty for improving watch jewelings, and it is not by any means as difficult as is imagined by many.

The horological school at this place (Glashütte) offers its pupils, by contracts entered into with resident jewelers, the opportunity of being instructed in this branch, and a workman of any talent may acquire the manipulation of making and improving jewelings in from eight to fourteen days.

Should the watchmaker himself not possess the requisite knowledge, and have no facilities at command to have it done by others, only one remedy remains, to withdraw the old and insert new and perfect holes.

When in some manner or other, the friction in the holes has been reduced to a minimum, turn your attention to the pivot ends, and increase the friction somewhat. This is done not by rounding, but by flattening the ends.

At first glance, this procedure, by which it is expected to equalize the resistances, appears to stand in contravention with a well-known natural law, which reads:

"Any friction occurring between two bodies during motion, is independent from the dimension of the engaging surfaces."

As far as regards the friction of the balance pivots of a watch in vertical position, it appears that this law exacts due attention to its observance, because no other remedy is known beyond lessening the dimension of the engaging surfaces, while by flattening the pivot ends, it is true, the contact surface is changed and enlarged, but at the same time the friction, which in the pivot with rounded ends occurred only at its center, is in this manner distributed over a larger radius, and, in accordance with the law of the lever, operates with increased force.

If, as happens in this instance, our repeated observations and experiences cannot at all times be brought into apparent harmony with clearly and definitely formulated natural laws, it must be accepted that other and mitigating circumstances intervene and cause a modification.

Also in this case it is not necessary to seek far in order to find that by every contact of two bodies, of which one is in motion, another resistance beside friction takes place, due to *adhesion*. And this resistance increases with the dimension of the engaging surfaces. The resistance of adhesion plays a more important part by this motion, because progressing under the influence of oil, and it being a to and fro motion.

The conclusion will be drawn at once from these remarks that the immutable laws of nature also are of vigor for our work, but that the watchmaker, by the extreme delicacy of the parts he is called upon to supervise and regulate, must endeavor to bring into harmony apparently enigmatical forces for his advantage and furtherance.

Let us return from this small but necessary digression to the field of practical execution; we have become satisfied that we must inake the friction in the different positions uniform by flattening the pivot ends, but the method in which this may be done, causes as yet many differences of opinion among our good workmen. Some cause the arbor to rotate in a chuck of the burnishing tool, and thus polish the end as flat as may be obtained in this manner, while others proceed as follows: They seize the balance arbor with a strong pair of tweezers, by which the balance places itself against their broad part, and set the pivot end flat upon the crocus plate. The balance itself indicates, compared with the face of the plate, a very close vertical holding of the arbor, and the crocus upon the plate polishes the pivot end, which may thus be reduced to a perfect flat. It stands to reason that the operation should not be prolonged sufficiently far to grind sharp corners.

The same ends are accomplished by both methods. Although the first, strictly taken, does not produce a plane face, but simply a very flat rounding, and the friction would as heretofore only occur at the pivot center. It is otherwise in reality, however, because if the arbor does not stand mathematically vertical, and the cap jewels are not mounted and placed truly correct, not always can the center of the

pivot alone be considered as productive of friction, but also more or less of its adjacent parts of the face.

There are many good watchmakers who regulate with strongly rounded pivots, compensating the difference, which thus arises necessarily with an unequipped balance in the several positions, by a trifling overweight of the latter. The end may also be reached in this manner. But considering that a perfect equipoise of the balance should be regarded as a primary condition, and that, as already stated, with a vibration of 440° , the balance is almost entirely insensible to any disturbances in the equipoise, while an overweight, in a vibration of less than this number, operates in an inverse ratio, it should become a matter of reflection whether to make use of this means. Let us suppose a watch which beats $1\frac{1}{4}$ circumferences (540°) regulated in this manner it will as soon as the vibration becomes less than 440° , make the double error in an inverse ratio.

It was easier in a verge watch, since in accordance with its construction, it could not vibrate more than 180° . The regulator was compelled even to make its balance heavier at a point below, since the pivot moved within brass holes, which cannot be made as small and rounded as stone holes. By the cylinder escapement, also, which does not beat full 360° , an overpoise may be used. By the duplex, anchor, and chronometer escapement, the above reasons become very important.

When observing a watch in both horizontal and vertical position, the regulator must accustom himself to regard the horizontal position as the normal one, since in this any inequalities of the balance exert no disturbing influence upon its rate. The watch must first be observed in this position, and its rate, when placed vertically, be compared with it. Consequently, he should not say, "the watch goes slower in a horizontal position," but, "it goes faster in a vertical position."

Having regulated to within an insignificant daily difference, by the index, we ascertain the rate for the last twenty-four hours, and then compare in hanging.

To avoid all equivocations and loss of time, observations must be instituted from at least four to six hours. If only a short time is permitted for regulating, the greatest exactness is necessary not to arrive at any false conclusions, in these short observation periods. Where one is not pressed for time, longer intervals are to be recommended.

To remove another source of errors, I would counsel the regulator to wind the watch after every observation, after having reduced the regulating to a small difference. Where time stands at one's command, it is well to let the watch go for six hours with the last spring coil, and to note extent of vibration and rate, in order to compare the data with those when the watch is fully wound.

By the regulating of even a single watch, in the positions, it is utterly impossible to dispense with the exact and comprehensive annotations; because it is out of the question to distinctly remember the rate in seconds and tenth parts of seconds, to use it again in six or more hours as standard, without deviation. Even if it were possible, who would charge his memory, while his attention has unflinchingly to be bestowed upon other work or business occurrences, with such useless and doubtful minutiae? How much more businesslike it is, to annotate his observations upon a small piece of paper, or, what is still better, in a little book, to which one may refer in the future, for the rate of every single watch.

Having ascertained by minute observations that the average rate of a watch in hanging and lying is of an important difference, it must be accepted that either the balance was not truly equipoised, or that it does not move with that exact uniformity within its jewel holes and cap covers, as it promised when in the balance scales. But we must proceed from the basis as we find the balance in the watch, and our effort must be to restore the equipoise to the degree as is indicated to us by the obtained difference.

When we have a watch before us in which, as is common with those of correct proportions, the balance fully vibrates $1\frac{1}{4}$ circumferences, and we find from observations that it loses in a vertical position, (a spring which causes it to make more than $1\frac{1}{2}$ should be replaced by a weaker one), we are forced to conclude, the friction proportions being equally good in both positions, that the balance, as it moves within the watch, has an overweight at an upper point. This error in a balance provided with regulating screw, may be corrected in three different manners, to wit: 1. If the watch, generally, even when horizontally, goes too slow, farther insert the upper screw by a trifle—that is, the screw which when the watch hangs, is above; 2. If it gains, draw out the lower screw; 3. If it keeps exact time, when lying, operate on both screws, as indicated, only very little however, and in equal quantities.

Having accomplished the necessary changes, in quantities to suit the demands of the case, we try anew. Having acted in tenor with the third rule just quoted, we may accept that the rate in a horizontal position has remained undisturbed, and we may continue with our observations in hanging.

The manner in which these annotations should be made is about as follows: A watch has been wound in the morning at 6 hours, 45 minutes, 15.6 seconds—and set to this time:

Morning	$6^h 45^m 15.6^s$			
	∞	15.6		
	$8^h 0^m$	20.3		54.2 — Daily difference.
Noon	$1^h 2^m 8^s$	18.8		7.2 + " "
	6^h	21.8		14.2 + " "
	∞	35.8		
	$11^h 20^m$	35.4		1.8 + " "
Morning	$7^h 10^m$	35.0		4.3 + " "

The accompanying mark ∞ is used to indicate that the watch was wound.

We compare it at 8 h. 50 m., and find 20.3 sec.—or in 2 hours 5 min., a difference of 4.7 sec.—which would give a mean daily difference of 54.2 sec., to correct which we regulate the index, and note it by a dash to the left.

We compare anew at 1 h. 25 m., and the watch shows 18.8 sec., a difference in 4 h. 35 m. of 1.5 sec. +, or a daily mean of 7.8 sec. +.

Not much time stands at our command, and we rest content for the present with this result, wind again and observe the rate in hanging, which is noted by an h in the middle.

The watch, at six o'clock p. m. shows 21.6 seconds—, consequently its daily rate is 14.3 sec.—; we also note it, marked with h , to the right, and find on comparison with last results horizontally, that the watch gives slower by 22.5 sec. per day in a vertical than in a horizontal position.

If this difference is to be remedied, the balance vibrating nearly $1\frac{1}{2}$ circumferences, we have to equalize an overweight at the upper rim. As the watch shows in a horizontal position 7.8+, we must make use of Rule 2, stated above, and slightly draw out the lower screw. The quantity cannot be stated, since it is dependent from the proportion of the several parts of the balance. Suppose the balance is weighty, but the regulating screws small and weak; more will have to be extracted by equal differences, than by one of slender proportions, but with regulating screws large, and possibly made of gold, as is generally the case in good watches, owing to the greater specific weight of this metal.

But in all cases be careful not to do too much at once. A quarter of a turn even produces notable differences, and the tightening and loosening of these regulating screws should be shunned as much as possible, as they easily become loose in their insertions.

We have loosened the lower screw by one-eighth of a turn, and we set the watch again, signifying this by a stroke through both previous figure columns; we wind anew and compare, say, at 6 h. 5 m., when it

indicates 35.8 sec.—, which is noted, and becomes the comparison number for further observations.

At 11 h. 20 m. we find 35.5 sec.—, equal to a daily mean of 1.8 sec.—. Consequently, the daily difference of the watch in a horizontal position has decreased from 7.9 sec.— to 1.8 sec.—, by drawing out the upper screw. Note the difference to the right, wind anew, and hang up the watch at 7 h. 10. A. M. we compare, and find 34.0 sec.—, or a daily average of 4.3 sec.—.

Comparing the differences with each other, we ascertain that the watch goes faster in a vertical than in a horizontal position, and that we let out the lower screw a trifle more than was necessary. A reinsertion would be in order, certainly, but since the rate in lying shows still a small acceleration, we effect the compensation by an almost imperceptible drawing out of the upper screw. This will equalize the last remaining difference between hanging and lying, and also any other general deviation.

Should noticeable, irregular and boundlike deviations become apparent during these observations, we must conclude, if no doubt or uncertainty attaches to the latter, that the watch possesses organic defects in the escapement or depths which preclude a close rate. If the removal of such defects is evaded by the general worthless condition of the watch and the disinclination of the owner to defray the expenses of a thorough repair, the watchmaker, even against his will, must content himself with giving it a general approximate rate.

When engaged upon a good watch, the regulator has to go farther yet than was here indicated. It would be a decided mistake to suppose that the hanging of a watch is equivalent to carrying it in one's vest pocket. Especially at present, when the prevailing taste discards all tight clothing, and wearing apparel is mostly of a loose, comfortable amplitude it demands no great amount of investigation to become satisfied of the fact that especially small watches are not always located in the pocket with stem uppermost. Wherefore carefully constructed watches, with reference to their rate, should also be tried in other positions than the two already indicated, such as with the III and the IX with the hands pointing upwards, and should be strictly in accordance with the directions laid down in these remarks.

This is the method, according to my experience which the workman should pursue to regulate the many different watches, occurring in the practice of repairing, for the several positions.

The task assumes other proportions, of course, if constantly occupied with watches of good construction, where the workman has the assurance that the balance pivots are hard, truly round, and well polished, and that the jewel holes are of good hard jewels, well polished, and strongly rounded.

Our experienced regulators are accustomed, when the watch has been regulated down to a small common difference, to very exactly equipoise the balance, and then to obtain its rate in vertical position by a close observation.

If the rate in a horizontal position, as is generally the case, is faster than in a vertical one, it is considered a sign that the resistance, when lying, produced by friction and adhesion, is smaller than when hanging; and the difference is equalized by an increased flattening of the pivot ends in the manner heretofore described. That an extensive practice and experience is necessary, and that by annotating the observation of rate, the greatest care and exactness are requisite is self evident. But he who has the will and patience, both requisite for this task, and bestows them upon the work in question, will meet with deserved success in his regulations; he will acquire the facility of regulating quickly and with great satisfaction, and will obtain the patronage of eminent customers, who will honor him with confidence and esteem.

(To be continued.)

Cameos and Cameo Cutting.

REUBEN KOONS.

OF all the precious stones none are more widely known and appreciated than cameos—and their opposite, intaglio, the latter having existed since the earliest ages, and were originally engraved only to be used as seals or signets. Many of these signets that have been found amongst the ruins in Italy and Africa, are models of engraving.

The uninitiated have but a faint idea of the labor that the poorest of stone carvers demand, and of the difficulties that beset their production. To write about cameos one has to begin to write about the places where they are made. In Oberstein and Idar—two towns in Oldenburg, now part of the German empire, respectively 4,700 and 3,700 inhabitants; nearly all the cameos that are used in America are

made here. Most of the inhabitants are engaged in the stone-cutting trade, and among the principal products are agate wards of all descriptions, and onyx, both sard and plain black.

The beginning of the cameo is the rough stone or agate, which at the present time comes mostly from Brazil. Large consignments constantly arrive, and instead of being sold to any buyer, they are invariably auctioned off. The rough stone varies in size from the smallest pieces to stones weighing one thousand pounds and over, and are valuable. Extra fine specimens bring fabulous prices. Although experienced buyers can conjecture from the appearance of one or two layers of the stone what its value is, yet there is no certainty, and the dearest onyx may prove to be of little value when it is broken up, the inside is often very poor. After purchase the rough blocks are sent to the cutting and polishing mills to be prepared for the engravers.

One word about these mills and their motive power. Idar Creek is a small stream which flows from the high hills which surrounds this country, and in its course of six or seven miles drives nearly a hundred stone cutting mills; the hilly nature of the country forming numerous small waterfalls, gives this stream immense water power. In each mill are four grindstones weighing upwards of three thousand pounds, and upon these monsters the stone is ground. The rough block is first prepared by breaking it with a hammer and chisel into desirable lengths, and then, if the thickness permits, the pieces are sawed into plates with a circular saw. This saw revolves very rapidly, and is charged with bort or diamond dust, and kept constantly moist. Now that the plates are ready to grind, comes the hard work. The workman who rents his stone or half a stone, (as two sometimes work at the same stone) prostrates himself before the grindstone, braces his feet against two supports and bears with his entire strength upon his stone. This work is necessarily slow, as from the very smallest to the largest pieces, the stones must be carefully ground, calibrated, and leveled to fit brass plates to which they constantly refer. After the stones are ground they are polished on a wood or lead wheel. Now they are ready for the engraver, and the artistic work begins.

Among the seven hundred cameo engravers are all kinds of workmen, but a great many of them are masters of their art. Yet as a body they receive but little pay for their work, and would be still worse off had they not two years ago combined, and established a tariff for engraving. They have ateliers in which from two to ten men work, and what will strike an American as peculiar, the poor workman gets as much as the good one for doing the same class of work. Most of the cameo engraving was performed in Paris by Germans up to the Franco-Prussian war. When that began, the Germans returned to their homes, and now the French cannot compete with them at all for the same kind of work. Cameo engraving is a very slow and delicate operation, and even the very cheapest grade of small stones, "tausendbrüder," or "thousand brothers," where the cut on every one is alike, take time and skill.

America is the largest customer for these goods, and as the engravers themselves have little or no means, most of the large houses have representatives here continually, who buy the rough stones and have them cut to the right sizes for the engraver.

At times during the summer the creek dries up, or is so low that the cutting mills can only run a few hours; in such cases there is always a dearth of rough stones, and naturally cameos are scarce. Each year the demand for cameos increases, and with all the facilities for production, the people of Oberstein and Idar cannot fill their orders during the fall season.

Years ago the cameo was the privilege of the wealthy, like fine sculpture and paintings, but now the masses of the people seem to have conceived an affection for this stone which bids fair to last for many years. The secret is, that they comprehend a cameo; it combines art with beauty, and the magic words, "real cameo," has sold many articles of jewelry, even of inferior workmanship. Of intaglio there is nothing special to write; the mode of cutting and engraving is identical with that of the cameo, but the stone is not used so much, although it is rapidly coming into favor. People who wear these stones have no idea of the number of operations and the work connected therewith that cameos go through before they reach the importer. I have therefore endeavored in a general way to describe some of the principle processes, and hope that I have succeeded in amusing if not in the higher attempt to instruct.

Diamonds and Precious Stones.

Translated for the JEWELERS' CIRCULAR from the French *Diamonds et Pierres Precieuses par Louis Delafosse*, Professeur de Géologie et Minéralogie à la Faculté des Sciences de Marseille. 2me ed. Paris, 1874.

PHYSICAL CHARACTERISTICS OF PRECIOUS STONES—WEIGHT AND MOLECULAR ACTION.

Specific Weight.—It is known that two equal volumes of different bodies have not the same weight; for instance, a piece of lead is far heavier than a piece of wood of equal dimension. If we find the weight of one substance and the weight of an equal volume of another substance, selected as a term of comparison, (distilled water has thus been chosen), and if we divide the weight of the first body by that of the second, a number will be obtained which expresses how many times and fractions of times, the body under consideration is more or less heavy than that to which it is compared; the number thus obtained is called its specific gravity.

When the substances are well defined and ever the same, as is the case with the greater part of the precious stones, this result is extremely important, because it frequently permits a decision without hesitation between stones which might be confounded by the eye. Thus, for instance, the diamond can at once be distinguished from the zircon, the specific gravity of the former being 3.4, and of the latter 4.4.

We will not speak of the process, simple as well as precise, by the aid of which these specific gravities are determined; they are perfectly well known, and may be found described at length in any works treating on physics.

Hardness.—We must be careful not to confound, as is frequently done, hardness with resistance to crushing or concussion. There are minerals that may be crumbled between the fingers, yet they are none the less hard. The hardness of a substance is the "resistance which it offers to the act of being scratched with a point, such as that of a steel needle, or with the angular part of another mineral drawn with friction upon its surface." (M. Delafosse.)

It is barely necessary to remark that hardness is for precious stones an indispensable requisite. If a stone were not very hard, the repeated frictions to which it is constantly subjected, would very quickly destroy its polish; its transparency, brilliancy, lustre, etc., would soon follow. In one word, everything that constitutes its value would vanish with the polish. Thanks to this hardness, combined with the inalterability of the matter that hard stones perfectly cut thousands of years ago, by Egyptian artists, have been preserved intact down to our day, and constitute to-day documents of the highest interest, because they permit us to state with certainty, in those ages so far removed, how much art and civilization, of which they are the manifestation, had already progressed.

Fusibility.—Fusibility is the property possessed by solid bodies of passing into the liquid state, when subjected to a sufficient temperature. For precious stones, in particular, the point of fusion is lowered in ratio as the composition of the stone becomes more complex. Thus the diamond, being a simple body, is absolutely infusible. The ruby, sapphire, topaz, being binary bodies, only melt under the action of the oxyhydrogen blowpipe. The simple silicate, ternary bodies, enter into fusion at a much lower degree; and the multiple silicates do not offer any serious resistance. The point of fusion of the different precious stones, being allied in a remarkable manner with their hardness, serves as a good characteristic for distinguishing them.

OPTICAL PROPERTIES.

Refraction.—When a ray of light passes through a homogeneous medium, it follows a straight path. Everyone has seen a ray of the sun entering by a little aperture into a place sufficiently dark, and has been struck with the perfectly magnificent spectacle represented by the solar rays escaping in brilliant sheaves through the openings in a mass of clouds.

But when a luminous ray passes from one medium into another one, the case assumes different proportions, and it is subjected to an extremely remarkable modification. It becomes more or less diverted from its original direction, and this phenomenon is design-

nated by the name of *refraction* (from *refractum*, broken). A stick plunged into water will illustrate this. When at theater, we view the actors on the stage through eyeglasses, we see them not in their real place. The rays of light emanating from them and which paint their image on our retina, pass by refraction, that is, by changing their primitive route, through the glasses of the lognette.

The extent to which luminous rays are dissolved in traversing transparent bodies, varies greatly. This difference in the refraction is generally in proportion with the differences in the nature and composition of the bodies, but it is not the only element which causes the entire production of the phenomenon. Considerations and experiences, the details of which we do not wish to state here, show that this refracting property of a substance stands in intimate proportions to its molecular constitution. Thus, for instance, Iceland spar and aragonite refract light in unequal quantities, although its chemical composition is identical, both consisting of pure carbonate of lime, but their molecular constitution is very different.

Double Refraction.—There is among transparent bodies a very numerous class of substances which possess a very curious property—they show two images of the same object. Thus, taking a crystal of Iceland spar and placing it upon a sheet of white paper on which letters or figures were traced, a double image will be produced, and what is more, both will show a deviation. Bodies with this property are said to possess *double refraction*, those without it, *simple refraction*.

When a body, crystallized or not, is perfectly homogeneous in all its parts, so that its elements are disposed everywhere in a uniform manner, it is easy to understand that the light must spread itself regularly while passing through; that it can have only one ray at the point of issue, and consequently only one image.

Crystals belonging to the monometric system will be found in this condition, and they will never offer the phenomenon of double refraction, no matter in what direction the light passes through them. If a crystal is chosen belonging to any system other than the regular one, things are changed. The molecular disposition is not any longer the same, in all its meaning, it will have certain directions, following which the light will not any more pursue one single path, and it thus obtains the effects of double refraction. Only, in this instance, we will perceive other and very different effects, in proportion as the body under experiment is more or less removed from the regular system.

Since precious stones of most value are crystallized, it will be seen how much the characteristics just treated of may be useful in distinguishing them, when it is known beforehand, as everyone to-day knows, whether a given stone possesses single or double refraction. But owing to the small size of precious stones, a certain procedure is necessary to arrive at a knowledge beyond any doubt, and to behold the phenomenon of double refraction, in case the stone is really bi-refrangent. If an object were viewed with it through two parallel faces, as has been mentioned in the case of Iceland spar, the thickness of the stone will be found far too feeble so that the eye might perceive two images; but if the same object is viewed through two faces inclined to each other, in the manner of a prism, (employing this word in an optical sense), the result will be far different.

Take for example, a small stone cut in the form of a brilliant, concerning whose nature we entertain some doubt.

The diamond, belonging to the monometric system, possesses simple refraction; but the bodies with which it may be confounded, ruby, sapphire, topaz, zircon, especially, etc., have double refraction.

Place the stone at a height with the eye, holding it in one hand; take an object of small dimension with the other, such as a pin, for example, and move it slowly to the other side of the stone until the eye catches it. If the stone is a bi-refrangent, the rays will bifurcate upon entering it, and two images of the pin will be seen, if not held too near. If held too near, the rays will not be far enough apart at the point of emergence into the air, to allow their separation to be perceptible.

If the experiment is made at night or in darkness, in place of the pin, the light of a candle placed at a certain distance may be used as object, placing the candle entirely beyond air currents, so that the flame may be steady and regular. The work will be exactly the same, and have the aspect represented in Fig. 1. If the phenomenon of



double refraction is produced, the conclusion may be drawn that the stone under test is not a diamond.

Polarization.—It is a well known fact that if a beam of light falls upon a plane and polished surface, it will be reflected; but it is not equally so well known that if to this ray, which has already been reflected at a certain angle, a second plane inclined mirror is presented, there will be certain positions in which this ray will no longer be reflected by the second mirror. The light, in its first reflection, has undergone a profound modification, and is designated by the name of *polarization by reflection*.

The light, in passing through certain crystals, undergoes exactly the same changes; that is to say, its rays emerging from the crystal, are no longer reflected when caused to fall with a certain inclination on a plane mirror; and that they have become completely powerless to pass through certain crystals, otherwise perfectly transparent, when these are presented to them according to a determinate direction. This is called *polarization by refraction*.

Double refraction and polarization, in crystals, are most intimately connected. Without entering into the consideration of these two great manifestations, which would lead us into the highest questions of physics and rational mechanism, we will simply state that it is sufficient for our purpose to know that all birefringent bodies, traversed by a ray of polarized light, and separated from the eye by certain crystallized substances, present magnificent phenomena of coloration, unattained by substances of simple refraction. It is consequently very easy, by the aid of the thousand polariscopes standing to-day at the command of science, to be assured upon the instant if a precious stone possess or not double refraction.

Dichroism, polychroism, asteria.—The phenomena designated by the preceding expressions, are given to certain conditions of refraction and polarization of light; all indicate that the substances which give them birth, are not constituted in a manner identical in all their parts.

ELECTRIC PROPERTIES.

Generally speaking, all bodies are able to acquire electricity by friction; with this difference that some retain for more or less time the electricity confined as it were within their pores, while others lose it instantly. The first are insulating bodies, the others, conducting bodies.

Precious stones belong to the first category; they exhibit a great resistance, however, in the length of time in which they remain electrified, and this characteristic furnishes to the practised hand, very useful indications to distinguish the one from the other.

There are certain precious stones which possess the very curious property of becoming electrified when heated. The tourmaline, especially, is susceptible to this peculiarity.

When precious stones are rubbed with the same material, generally a piece of cloth, some of them will acquire a positive, others a negative electricity. Tourmaline and other substances which take electricity by heat, generally show positive electricity at one extremity and negative electricity at the other.

EXTERIOR CHARACTERISTICS.

Transparency.—The property possessed by precious stones of being more or less easily traversed by rays of light is called *transparency*.

They are called *transparent* when, being interposed between the

eye and an object, they permit all its outlines to be seen with clearness. Example, the diamond.

They are *semi-transparent* when the objects seen through them are a little confused. Example, the emerald.

They are *translucent* when nothing can be discovered through them when held before the eye, but that the light passes through them in an evident manner. Example, chalcodony.

Finally, they are *opaque*, when not a ray of light can penetrate them. Example, the jasper.

LUSTRE.

"The minerals manifest a great difference among themselves in the manner in which the light acts upon their surface. In this respect, two different effects must be distinguished: their *lustre* and their *color*, which are one to the other as timber is to sound in a musical instrument. Color depends upon the nature of the reflected rays, lustre is due to their intensity, and under certain particular modifications to their tinge, which cannot be defined, however; it depends upon the structure of the body, kind of texture, and greater or less polish of its surface. Lustre, in common with transparency and color, generally speaking, is susceptible to gradation; it is more or less vivid more or less dull, and disappears entirely in varieties whose aspect is dead, stony, or earthy."—(M. Delafosse).

Adamantine lustre.—It is intermediate between metallic and vitreous lustre; it is peculiar to several crystals, to the zircon, but especially to the diamond.

Nacreous, or pearly lustre.—A mixture of silvery and vitreous lustre, resembling, as its name indicates, the nacre of pearl. Certain varieties of corundum possess it in a very pronounced manner.

Silky lustre.—It is due to straight fibres very closely woven, and of equal thickness. It resembles the glitter of mohair.

Oily lustre.—The stones possessed of this lustre are generally vitreous stones which always appear, even when recently fractured, to have been impregnated with oil.

Resinous lustre.—Intermediate between the oily and vitreous lustre. The opal generally presents this aspect.

Vitreous lustre.—This lustre recalls exactly the fracture of glass. It generally belongs to bodies of small refracting power.

ACTION OF LIGHT AND HEAT UPON PRECIOUS STONES.

Light.—When the rarest precious stones, especially the diamond, are exposed for a time to the sun's rays, and thereupon taken into darkness, they remain luminous, and exhibit what has been called the phenomena of phosphorescence. This peculiar effect lasts for some time, but becomes more faint by degrees, and finally disappears.

Heat.—The effects produced by heat upon precious stones are still more remarkable than those produced by light. Heat acts upon them in two dissimilar ways. It modifies the elementary constitution of the stone by extending its molecules, but this in a manner altogether mechanical; or it produces in the stone a veritable chemical reaction. In the first case, the modifications will be but temporary, and at length the objects return to their primitive condition; in the second case, the effects produced are permanent.

As an illustration of the latter case, we cite a practice, the origin of which is lost in antiquity, and which is still in vogue among the lapidaries of our age. It consists in submitting a colored stone (diamond, topaz, etc.) to a temperature more or less elevated. The stone, nearly always, changes permanently in these conditions.

An extremely remarkable communication of M. Frémy to the *Académie des Sciences* will serve as an illustration of the first case. "MM. Haléens have the honor to present to the Academy a diamond 4 grammes (about 20 carats) presenting a phenomenon which has never been observed heretofore, at least to their knowledge.

"This stone, in its normal state, is white, slightly tinged with brown. When submitted to the action of fire, it acquires a very clear rose-tint, which it retains for eight or ten days, and which it loses gradually, returning to its normal primitive color.

"MM. Haléens have the honor to return to its primitive state, which is repeated indefinitely, because the stone submitted to the Academy has undergone this test five or six times.

"The phenomenon in question at first attracted the attention of an observer who experimented with this diamond to ascertain the prolonged action of fire. Experiments made since upon other diamonds have not produced like results.

"The question of the colorization of diamonds is of an importance which the Academy will easily appreciate, when it considers that the stone presented at this moment, in its present state, has a value of 60,000 francs; but that its price, if it were rose-colored and permanent, would be from 150,000 to 200,000 francs."

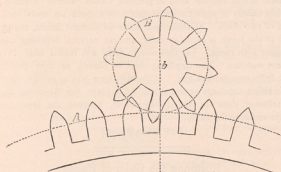
*Comptes Rendus de l'Académie de Sciences, t. LXII, 1866.

Guide for Watchmakers's Apprentices.

BY HERMANN SEVERT.

[Continued from page 120.]

We now commence the draught of the depthing. We first draw the center line *A B*, Fig. 7, and describe the pitch circles *A* and *B*. We drew the teeth upon *A*. To obtain these we draw a circle of equal dimensions upon another piece of paper, divide it into eight equal parts, each one of which is again subdivided into another eight. This is best and most correctly performed by help of a protractor or angle measure. The part so found are carried, beginning at the center line, toward both its sides, upon the pitch circle *A*. Each part represents a tooth together with a space, or interval. Half this part is taken for the breadth of the tooth, in order to give it the requisite rounding and extension to drive the leaf sufficiently, thus the breadth of the tooth is equal to that of the interval. After thus having rough-



sketched both the teeth and in the rounding form, taking especial notice of the center of the leaf, and against the space mon form of the leaf rounding is in the Fig., which has been drawn outer thickness of the leaf. If circular leaf rounding with that a remarkable difference. After bottoms of wheel and pinion, we

We thereupon draw the pinion, circle from the center line, into tain the necessary shake between only one-third of the space for to secure its strength, because a steel, and we have for shake of $\frac{1}{2} = 2.6$ for the leaf, $\frac{1}{2} = 3.6$ for 1-6 left. The leaf flanks also they are touched by the tooth-pinion radius. The form of the circle is of no consequence to be rounded off, however, and its on the tooth or against the space mon form of the leaf rounding is in the Fig., which has been drawn outer thickness of the leaf. If circular leaf rounding with that a remarkable difference. After bottoms of wheel and pinion, we

A close inspection of this has been said of depthing with a The depthing represented shows the contact of tooth and leaf on the center line; but the preceding tooth must have already become disengaged, because both have ceased touching each other. Consequently a small amount of driving must have taken place before arriving at the center line, and it is this which makes all depthings under twelve leaves imperfect. Of course, the engagement before the center line of a 10-leaf pinion is so insignificant as barely to be noticed in a drawing, but by six leaves the driving must begin before the center line to an important amount.

intervals, we next give them ial care that the corner *a* of the wheel. The tooth-flank wheel radius.

and also divide its pitch eight equal parts. To ob-tooth and leaf, we take the leaf. This is sufficient pinion is made of hardened tooth after having taken the entering tooth, still must, especially so far as rounding, concur with the leaf outside of the pitch depthing, its corners must point not so long as to rub bottom. The most com-that of a circle, as is shown by a radius equal to the you carefully compare this of the tooth, you will find having drawn the space have finished the sketch. drawing will confirm what small number of leaves-

There are several methods to alter the depthing of Fig. 7, thus that the first concave shall begin at the center line. By a theoretically correct way this can be secured only by a prolongation of the rounding curve, which change necessarily demands a greater breadth of tooth. This is followed, however, by a significant diminution of shake, because the leaves must retain a certain strength. The moral to be drawn from this is that an unnecessary size of leaves is injurious to a depthing.

A contact before the center line may be remedied in another manner. Imagine wheel and pinion in Fig. 7 to be moved closer together, and the preceding tooth will reach the corresponding leaf. This would partly diminish the shake, and would also give rise to the very error pointed out in Fig. 6, *a*, and sought to be avoided by beginning the rounding form of the tooth at the pitch circle of the pinion. When the centers of both wheel and pinion are moved so close together that their pitch circles intersect each other, a part of the straight tooth flank is brought into contact with the straight leaf flank, and the effect of a changed length of levers commences.

Another remedy for the avoidance of the driving before the center line might consist in diminishing the size of the pinion, thus lessening the distance from one leaf to the other. It is perhaps needless to mention that in both cases the primary principles of a correct depthing have been disregarded, viz., the uniform velocity of the circumferences of the pitch circles standing in a correct proportion to each other.

You will easily see that the tooth rounding by a depth of other proportions of teeth and cases, must equally change with them, and the proper epicycloid must be found for each depthing, by calculation and sketching, as given above. It is a very interesting occupation for the growing-up horologist to calculate and make drawings in accordance with the above explanations, and one well fitted to best teach him how to judge between correct and faulty depthings, or shallow or deep ones, and when he meets with one of these in his future practice, that he may know how and where to apply the remedy. It would occasion too much labor, and is impracticable to correct each depthing in common watches, but many a one is open to improvement by a little skill, if the repairer knows how to apply it.

The following gives a few additional errors which a depthing often has. Imagine the figure so that wheel and pinion are placed farther apart, beyond the contact of their pitch circles. You will see that the tooth in its engagement does not then press upon the straight flank of the leaf, but against the rounding; the preceding tooth cannot propel sufficiently for the leaf, the contact of the following tooth takes place too far ahead of the center line. Both motions produce a hard, jolting friction of the engaging teeth, occasioning great loss of motive power, sometimes of a magnitude sufficient to stop the watch. Such a depthing is called shallow.

On the other hand, a depthing may be placed too deep. In this case, a part of the tooth flank lies against that of the leaf, thus producing an unequal motion with a changing lever power. The leaf, moreover, is driven farther than necessary, and the tooth following has not yet arrived sufficiently far, while the leaf flank is already in the center line. The attacking point of the wheel is placed closer to the pinion center, and within its pitch circle. Consequently, the wheel operates upon a shorter lever, and imparts less power to the pinion. The wheel, at the same time, moves correspondingly slower, and is retarded somewhat in its velocity of circumference behind that of the pinion. As soon as the preceding tooth disengages from the pinion, the wheel passes through this distance, and will expend its reserved power in a useless and injurious knock. This error repeats itself at every tooth, and is called the recoil. This defect is not the less injurious, even if it do not produce the standing still of the watch, especially when accompanied by teeth so long as to touch the pinion bottom, or an utter absence of all shake; beside an irregular transmission of power it causes a quicker wear of operating parts than a shallow depthing.

You have thus seen how power may be transmitted irregularly, even by correct tooth form, when, moreover, the distance is proportioned, and the driving commences on the center line, the depth may be a very faulty one, owing to a bad form of tooth and leaf. A small difference may be noticed already in the uniform forward motion of the depth, when the tooth rounding form is of a circular shape, instead of the rolling line, and, although approaching very nearly, can never produce a correct depth. Both shapes are given in Fig. 8 for a clearer understanding. Flank and rounding must form an uninterrupted line, when the tooth rounding is circular.

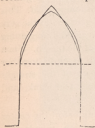


FIG. 8.

There must be no corner or shoulder at the junction of flank and rounding. Let us suppose such a depth. The movement of the wheel will at the beginning be somewhat retarded, because of the extra breadth; thereupon, because the rounding falls off very notably, it will change into a gradually increased sliding against the pinion leaf. Corresponding with it, because the velocity of the pinion circumference is first faster, then slower, reversely that of the wheel, the power to it transmitted at the first encounter will be small, gradually increasing, and at the time when the tooth is ready to become disengaged, it will be strongest. The error, however, is not so significant as to produce much mischief in watches of a cheap construction. The depth becomes radically wrong when the leaf also has a faulty rounding form, as in Fig. 9. As will be seen by the sketch, the depth is not so favorably located, owing to the inclined faces pressing against each other. The leaf driving is most faulty, lacking, on account of its being rounded, the straight flank. The wheel tooth will, after a much accelerated sliding motion, disengage from the leaf, and the following contact of tooth and leaf will occur too far ahead of the center line, and a jolting friction ensues. The evil may be partly obviated by placing the depth deeper, but such a tooth form will always occasion great difficulties, and never become good. Whenever you meet such a one, you will know what cause to assign for it.

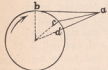


FIG. 9.

Another error is occasioned by the weakness of the teeth, and the rounding form cannot receive its full dimension. (Fig. 10.) Such a depth is often found in old and sometimes very good watches; the pinion will be found rather larger than is proportionate with the diameters, the tooth flank enters too deep into it. It will place itself on the center line with its straight flank against the leaf. By a forward motion of the depth only the tooth point will touch the pinion at δ , and the length of the pinion lever is changed from a to $a\delta$, occasionally an important change of power. Besides this, a certain grinding friction takes place, owing to the strong motion of the short rounding on the leaf flank, and much prolonged in pinions with a small number of leaves. When you encounter a pinion into whose leaves deep grooves have been ground, you will know by what it was caused.

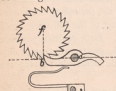


FIG. 10.

It is also a great error when the pinion is either too large or too small. In the first case a recoil or jar will occur, in accordance with being placed deeper or shallower, at the proper distance both will occur together. If the pinion is too large, the engagement will take place too far before the center line, or it will have to be placed so deep that no tooth shake remains. If the error exceeds a certain degree, a new pinion must be put in.

It is customary to determine the size of a pinion by measuring across a certain amount of teeth. This is really a reprehensible method, and very inexact, because, as has been stated, not the full,

but the pitch diameter determines the proportionate size of the pinion to the wheel, and the latter does not stand in certain defined proportions to the full diameter, changing, as it does with the rounding form of the leaf. The pitch diameter of the pinion can best be ascertained by that of the wheel, being divided into equal parts. Since this cannot be well measured, however, we will not err much by measuring the full wheel diameter, then counting the height of the rounding equal to the tooth breadth, consequently deduct twice this breadth from the full diameter. As already described, we divide this into as many equal parts as the number of leaves is contained into that of the teeth. The pitch diameter of a pinion may by some practice be ascertained by measuring the flat face across the leaf ends. When we have to make a new pinion we first ascertain the rounding form which its pinion must have. By a circular rounding, we add twice one-half, or one entire breadth of the leaf, by a pointed arch form, about $\frac{2}{3}$ more of the breadth, to obtain the entire diameter of the pinion. The thickness of a leaf is, as you know, counted equal to $\frac{2}{3}$ of the breadth of the tooth.

There is still another kind of pinions, called hollow pinions. It consists simply of round rods, inserted with both its ends into the holes of two discs. As these rods have no straight flanks, the epicycloid of the tooth is of no account, and no correct depth can be obtained with them. For this reason they are found only in very current watches. The depth must be placed so that the tooth flank fully engages the leaf. If the depth jars or recoils, the pinion is either too large or too small. To place the depth deeper or shallower, does not remedy the defect, because the lever length always remains the same.

[To be continued.]

Restoring the Color of Pearls.

FINE pearls either are yellow by nature, and this cannot be removed by any means, or they turn yellow by habitual wearing in the hair, on the neck, or on the arms, by imbibing perspiration. This color may be removed in the following manner: Boil them in cow's milk, into which shave a little soap, for about one-quarter of an hour, then take them out, rinse them in pure water, and dry them in a clean, white cloth, and see if they have become white; if not, make a loaf of bread of barley flour, put the pearls within, either strung on a silk thread or wrapped in a thin tissue; let the bread bake strongly, but not too brown; let it cool, and take out the pearls. They will generally be restored in this manner, but if they are still somewhat soiled and yellow, it is a sign that the dirt has penetrated too deep, and ordinary means are useless; they will be green or blue sometimes, which originates from having been strung on silver plated wire, and forcible means must be adopted. Take a teaspoonful of warmed wine vinegar, and suspend the pearls within it for a few minutes, or nitric acid diluted with its bulk of water produces the same effects; take them out and rinse with water; repeat the operation several times, until the green or blue color disappears and the pearls become white and pure. This remedy will never fail, except the pearls are yellow by nature, which, as already said, nothing will remove. Their boiling in milk and soap dissolves the dirt; the bread imbibes it by the vapors arising, and both means may be used with impunity—as it never will hurt the pearls; but great care is necessary when using the vinegar, and, more especially, the nitric acid, because the acids attack the pearls, and dissolve the outer coating, and they must be taken out and rinsed repeatedly to prevent their being destroyed. But by the use of care, merely one or two of the outside layers is removed, and the pearl will become new. It is said above that the blue or green color originates from the silvered copper wire, and persons occupying themselves with their mounting should be cautioned against its use, and prefer thin silver wire. Pearls which have become thus colored and stained lose very much of their value.

Business Notes.

A. Weston, formerly with L. A. Cuppia, is now in the employ of C. Rossow & Son as city traveler.

The Duerbe Watch Case Manufacturing Co. have established a branch office at No. 16 Maiden Lane, New York.

Our London exchanges announce the formation of the British Celluloid Company, limited, with a capital of \$150,000.

Jacob Bennett & Sons, diamond setters and manufacturing jewelers, of Philadelphia, have removed to 923 Chestnut street.

Adolph Marx, of the firm Kossuth Marx & Co., has gone to Europe for the purpose of selecting diamonds and other goods.

Thos. Le Bouillier, of Le Bouillier & Co., left for Europe June 23d, to look for novelties in clocks, fancy goods, bronzes, etc.

Chas. C. Buder, of Columbus, Miss., recently led to the hymenial altar Miss Sophia Goodwin, one of the fairest daughters of that town.

E. L. Anrich sailed for Europe in the *Scythia* June 22, with a view of engaging diamond cutters and polishers for his establishment in this city.

W. H. Shearer & Co., of Philadelphia, have opened an office at 15 John street, New York, where a full stock of goods of their own manufacture may be found.

Retail dealers desiring electrotypes of the Acme Lever Buttons for advertising purposes, can obtain them from the jobbing houses with whom they buy the goods.

William Bardel, of the firm of Heller & Bardel, who has been abroad for several months, has recently returned in good health and much improved by his European trip.

Chas. D. King, an old and well known traveler, representing Aiken, Lambert & Co., manufacturers of gold pens, etc., has recently returned from a remarkably successful trip.

A. Lorsch has removed to more commodious quarters in the building long occupied by him. He has more extended accommodations for the display of goods and convenience of his friends.

Mr. C. Billings, of Randel, Barenore & Billings, recently arrived from Europe in the *Gallia*. Mr. Randel, senior member of this house, left for Europe on the 22d of June in the *Scythia*.

Jules Gruet is expected to return from Europe early in July. He went abroad for the purpose of replenishing his stock of garnets, and is understood to have been very fortunate in his selections.

Isaac M. and J. W. Miller, of the firm of Miller Bros., sailed for Europe in the *Adriatic*, June 1. They have devoted themselves assiduously to business for many years, and now propose to take a little relaxation.

The firm of King & Stebbins, of Jacksonville, Ill., has dissolved. J. W. King will continue the business. Mr. King is well and favorably known in the trade, and his numerous friends will wish him every success.

A. M. Wood, of Kearney, Neb., has failed, making an assignment of his entire stock to John Farley, whose claim against him was only \$1,000. Creditors of Mr. Wood are dissatisfied with the situation of affairs.

Messrs. Zehner, Jackson & Buechner, manufacturing jewelers at Cheyenne, Wyo., have purchased the building occupied by them, from the old firm of Joslin & Park, late of that city. We wish this enterprising firm a long and prosperous career.

Ludwig Lehman, manufacturer of jewelers' findings, makes a specialty of fine paper boxes for jewelers and silversmiths. Also keeps a full assortment of jewelers' Morocco cases, cards, tags, cotton, etc., to which he invites the attention of the trade.

The safe that stood in Wise's jewelry store in Brooklyn, and which the burglars attacked without success, was originally built for Carter, Sloan & Co. It went through the Bond street fire successfully, and has now baffled the burglars. It was made by Henrickson.

Leon Jeanne, of Jeanne Bros., manufacturers of diamond goods, sailed for Europe in the *Amerique*, June 15. Mr. Jeanne will visit London, Paris, Vienna, Berlin, and the principal business marts of Europe, in search of new styles and designs of work in his especial line.

Henry Hanover of Messrs. Kahn, Hanover & Co., is expected to return from Europe about the 15th inst. Mr. Hanover's stay in Europe has been marked by a display of good taste and judgment in his selection of artistic novelties, which reflects great credit on the enterprise of the firm.

The firm of Spiess & Rossow, manufacturing jewelers has been dissolved. Mr. C. Rossow, who succeeds the old firm, has associated his son Hippolite C. Rossow with him, and will continue the business under the firm name of C. Rossow & Son, at the offices so long occupied by the old firm.

G. W. Ludwig & Co., of Chambersburg, Pa., are among the most enterprising jewelers of that state. They are constantly introducing new artistic goods of our best manufacturers to their customers, with a view of educating them to a higher appreciation of art work in gold and silver.

Mr. B. H. Knapp, the courteous cashier with Messrs. Wheeler, Parsons & Hayes, has been lately sojourning abroad for the benefit of his health. His vacation was deserved, as it has been well earned; the first he has had in thirteen years. He returns to business fully restored in health and vigor.

Messrs. Stern Bros. & Co., of this city, have recently introduced a very attractive locket, representing a latticed window; by touching a spring, the lattice flies open, revealing the photograph of some fellow's girl, for instance. The idea is decidedly novel and pleasing, and an exceedingly attractive article of personal adornment.

Hennege, Bates & Co., of Baltimore, will shortly move into the building formerly occupied by Canfield Bros. & Co. The store is now undergoing extensive repairs under the direction of W. B. Smith, the well known cabinet and show case maker of this city, who is fitting it up in an artistic manner, worthy of the distinguished firm who will shortly occupy it.

Ed. A. Thrall has removed to a neat little store at No. 1 Maiden Lane, which he has fitted up in a neat and artistic manner. Mr. Thrall offers his services to the trade as a purchasing agent for out of town dealers. His knowledge of the trade and the class of goods required by country dealers will doubtless be useful to those whose business acquaintance is limited.

Messrs. L. & M. Kahn are the agents for Swiss automatic clock pictures. They represent various pastoral scenes and landscapes, running brooks, animated domestic animals, etc., but each one has somewhere about it a handsome timepiece, keeping correct time. The works of the clock contribute to give movement to various objects represented in the picture. These clock pictures are highly original and exceedingly attractive.

The new offices of the American Watch Co., at Nos. 403 and 405 Washington street, Boston, to which the company has recently removed, are marvels of architectural beauty. A suite of three large rooms occupying the entire front of the second story of this magnificent building, have been elegantly fitted up with every convenience which cultivated taste can suggest. They are finished in cherry and cathedral glass, and present an imposing and highly effective appearance. These offices are elegantly appointed in every respect, and may be classed among the most elaborate and substantial business homes in Boston.

A new jewelry manufacturing company is being organized at Plainville, Mass., a suburb of North Attleboro. The new company is to consist of twelve practical workmen now employed in the various factories at that place.

Only the members of the company will be employed at first, and the business will be conducted on the co-operative plan. The Plainville Manufacturing Company was organized some years ago on the same plan, and is now doing a successful business, although some of the original members have dropped out. The proposed new company receives every encouragement from the old established manufacturers of Plainville.

Richard Oliver, a well known jeweler in John street, recently sold a pair of remarkably fine diamonds; they were beautifully matched in size, shape and color, perfectly white, weighing 12 1/4 and 1-16 carats, and composed of exquisite material. One of the stones was selected and cut in Europe to match the other, and were the admiration of the trade. They were skillfully set in very simple and plain settings, so as to fully exhibit the gems to their best advantage. It would be exceedingly difficult to find two so perfect and faultless gems possessing such exceptional beauty. The happy possessor paid Mr. Oliver \$15,000 for them, and presented them to his wife as a birthday offering.

Mr. George W. Washburn, of this city, has secured letters patent for two new devices for ear fastenings that will doubtless become popular with the trade, the advantages of which are fully set forth in the advertisements to be found elsewhere in THE CIRCULAR. The first patent relates to a fastening for the ear, and consists of two parts united by a hinge joint, as seen in the illustrations describing the invention. The upper part constituting the ear wire is solid, while the lower part is hollow, and fitted to match the ear wire, which shuts into it; in the hollow part is a spring which, when the fastening is clasped, clamps a notch in the end of the ear wire and holds it secure. By pressing two small points on the outside of the lower segment, the spring is released, and permits the fastening to be easily removed. To the open ring of the fastening any jewel can be attached and made perfectly secure. The second device is designed to bring the ear jewel into immediate contact with the lobe of the ear. A long loop, which serves as a support for the ear jewel, and also as the ear wire is constructed, also united by a hinged joint. This loop, which is ready to be readily inserted in the ear and clasped behind. With many ladies it is deemed a great advantage to have the ear jewels rest against the lobe of the ear. By this device this point is secured, while the ear wire is small and inconspicuous. These ear fastenings are made exclusively for Randel, Barenore & Billings, importers of diamonds and manufacturers of diamond jewelry.

Trade Gossip.

Business in Chicago is reported dull.

Rubies continue to advance in price; fine goods are very scarce.

The English watch factories are having a hard time on account of dull trade.

We look upon the dark side of nearly everything but cheap jewelry. That dazzles us.

Pearls of five grains and upward have advanced 20 per cent. within the last two months.

E. W. Trask, a well known and enterprising jeweler of Aurora, Illinois, died married June 15.

The jewelry store of F. F. Brackett, Biddeford, Me., was recently robbed of some \$2,000 worth of jewelry, etc.

A furnace in the smelting works of E. Balbach, Newark, exploded, causing considerable damage to the building. Fortunately, no lives were lost.

A Maine jeweler has been made seriously ill by inhaling the dust from an old clock which he was repairing. Paris green had been put in the clock to kill bugs and came near killing the jeweler.

Felix Albert Vogel, the ruffian who attempted to abduct Mr. Strasburger's little daughter Rosa, has been convicted in the court of general sessions, and sentenced to seven years imprisonment and a fine of \$250.

Mr. J. Horton has entered the employ of Wheeler, Parsons & Hayes, as bookkeeper. In musical circles Mr. Horton is distinguished as a baritone singer, having a rich and cultivated voice of rare capacity.

A citizen of Atlanta, Ga., has in his possession, according to a local paper, an amethyst recently found in Rabun county, which contains a drop of water in the center of the stone. This is said to be the only instance on record of any amethyst so peculiarly formed. That makes it an amethyst of the first water.

An attempt was recently made to rob the jewelry store of Richard Smith, Broad street, Newark. The thieves attacked a large safe containing several thousand dollars worth of goods, but were unable to effect an entrance. After securing about \$100 worth of insignificant articles, they abandoned the store, leaving their tools behind.

The trial of Eugene E. Post, of the firm of Post & Spier, who was indicted on complaint of Wm. H. Ball, for obtaining goods under false pretenses, lasted nearly two weeks, and resulted in a disagreement of the jury. There are other indictments pending against Mr. Post, and these, it is said, will be pushed to trial as soon as possible.

A well known Iowa watchmaker observed to an old farmer, whose house he had visited, to see—well, no matter who: "Mr. Jones, your clock is not quite right, is it?" "Well, you see, sir," said Mr. Jones, "nobody don't understand much about that clock but me. When the hands of that clock stands at twelve, and it strikes two, then I know its twenty minutes to seven."

James Moore, formerly of Toledo, but more latterly of Chicago, is reported to have suddenly disappeared from the latter city, leaving a number of creditors to mourn his abrupt disappearance. A singular thing about it is that the greater part of his stock disappeared at about the same time he did. No more does Moore visit his favorite haunts, and there is more profanity evoked at Moore's departure than Moore would care to hear.

A jewel in a swine's snout would be no more preposterous than a \$1,500 diamond ring in a horse's hoof. The latter absurdity recently came to pass in Tennessee. In the possession of a blacksmith was found the ring, which a young lady lost while riding several years before. The blacksmith dislodged it in paring down the horse's hoof and handed it to his wife, who restored it to the owner's father while he was visiting her sick child.

At a meeting of the jewelers of Rochester, N. Y., May 26, it was resolved to form a jewelers' union, for the purpose of protecting the trade and the public from the frauds that are perpetrated by a class of manufacturers who have no scruples in regard to depreciating their goods, or selling cheap plated goods for genuine. Many jewelers have expressed their willingness to become members, and it is proposed to hold a state convention at no distant day. New York is thus falling in line with the more western states, to protest against the fraudulent practices indulged in by a class of manufacturers, who are more bountifully supplied with copper than conscience. It only requires the hearty co-operation of retail dealers to reform existing abuses, and bring the trade into better repute. We wish the proposed movement every possible success.

A state fair is to be held at Atlanta, Ga., in the early part of October. It is intended to make it an event of importance to the commercial interests of the entire country. All the products of the state will be exhibited, and large prizes will be given. It will afford an opportunity for the enterprising men in the trade to exhibit their goods. Of course, our friend Stevens will be in attendance, and will, doubtless, make a display that will be creditable to the jewelry trade.

A traveler in the employ of H. F. Hahn & Co., of Chicago, left his trunk, containing samples of watches, jewelry, etc., in the depot at Glenwood, Iowa, from Saturday till Monday morning. During the interval the depot was broken into by tramps, who ransacked the trunk and carried off about \$800 worth of goods, chiefly in cheap watch movements. These tramps are certainly well fixed for time, when their chances may be in eternity. The question of responsibility will depend upon the conditions under which the traveler left the trunk in the depot.

The New York Jewellers' Club will leave July 5th for Providence, to compete with the Providence Club in a game of base ball. This is the third game, each club having already won one, and it will unquestionably be a spirited game. The New York boys have been practising of late, and are reported to be in good condition and playing well. The nine will be composed of the following players: Messrs. Parks, Dana, Scribner, Morse, Gaunt, Fuller, Keane, Fenn and King. Messrs. Crouch & Fitzgerald, trunk makers, have presented the club with a very beautiful trunk for carrying their field paraphernalia.

Richard Hawkins and William Hawkins, jr., of Newark, were arrested recently on a warrant procured by Aaron Carter, of the jewelry manufacturing firm of Carter, Sloan & Co., formerly Carter, Hawkins & Sloan. The accused were formerly employed by the firm, and their arrest was made on suspicion of their being connected with thefts of goods from the factory. It is also alleged that Richard drew from the firm several thousand dollars for the payment of the factory hands which it is claimed was never used for that purpose. The accused were held for trial, which is expected to take place in August. Both young men are sons of the former partner in the firm.

A young man with a gruff voice rushed up to the first floor of 48 Nassau street on the 8th inst., put his head into H. Folker's jewelry room, and yelled: "Package for you down stairs. Come and sign the book." He rapped the door and ran down stairs. Mr. Folker followed, but found neither man nor book at the door. When he got back to his room again he found the safe door, which he had left unlocked, standing open, and a case with several watches missing. The watches belonged to customers. The case was found up stairs, but the watches were gone. So was the partner of the gruff young man. The jeweler thinks \$200 would cover the value.

A watchmaker in Newcastle, Penn., says a Pittsburg paper, has completed a set of three gold shirt studs, in one of which is a watch that keeps excellent time, the dial being about three-eighths of an inch in diameter. The three studs are connected by a strip of silver inside the shirt bosom, and the watch contained in the middle one is wound up by turning the stud above, and the hands are set by turning the one below. But perhaps the most remarkable thing about the liliputian machine is that it works with a pendulum, like a clock, and the pendulum will act with ease and accuracy in whatever position the timepiece is placed, even if it be turned upside down.

At a regular meeting of the Chicago Jewellers' Association, held June 7, 1881, the following officers were elected for the ensuing year: H. F. Hahn, of the firm of H. F. Hahn & Co., President; Ethel Kearney, of the firm of Kearney & Swartzchild, Vice President; Elissa P. Whitehead, Secretary of the Elgin National Watch Co., Secretary and Treasurer; W. F. Tompkins, Manager of the Seth Thomas Clock Co., Paul Juergens, of the firm of Juergens & Andersen, and Henry Oppenheimer, of the firm of Henry Oppenheimer & Son, Finance Committee; Benj. Allen, of the firm of Benj. Allen & Co., Steadman H. Hale, attorney for Robbins & Appleton, and C. H. Knights, of C. H. Knights & Co., Membership Committee.

A year ago, Mr. Julius Walker, of Buffalo, after having been in business thirty years, was obliged to ask an extension of his indebtedness, promising to liquidate in monthly instalments. He kept his promise faithfully, completing his payments on the 10th of June. Mr. Walker set an example that many others laboring under business embarrassments might follow with benefit to themselves and to the trade in general. An extension of time is accepted in faith by the debtor, is far better than a compromise at 25 or 30 cents on the dollar, a transaction that generally leaves an unsavory odor behind it. Mr. Walker's determination to pay his creditors dollar for dollar is evidence of an honesty of purpose that cannot fail to commend him to the friendly consideration of the trade.

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THE

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The Work that Needs Doing.

RECENTLY the *Herald*, the *Times*, and the *Evening Post*, of this city, have published articles relative to the jewelry business, devoted however, mainly to exposing the "tricks of the trade." Unfortunately, the writers had too substantial a basis of fact to build these articles upon to permit of their being denounced as untrue or exaggerated, and withal, they showed a degree of familiarity with the business that is a credit to them. It was humiliating to us, and to the better class of the trade, to read in journals of such wide circulation, how the public is swindled by sharp practices in the manufacture of watch cases, that are so robbed of the gold that should constitute them that there is little left to them but base metal and steel springs; how 10 karat watch chains are sold for 14 karat goods by virtue of a 14 karat swivel; how solid gold rings are filled with copper wire and an 18 karat stamp put on 12 karat goods; how plated goods are palmed off for solid gold; and how the quality of goods of all descriptions is debased, and stamps used to indicate a greater value than they actually possess. It is humiliating to read these things in the public prints, and to be unable to deny them because we know them to be true. But a few years since the term jeweler was a synonym for honesty, integrity and respectability; a jeweler was regarded as a solid, substantial citizen, whose word was above suspicion, and whose wares were actually what he represented them to be. But the times have sadly changed. Unscrupulous men have forced their way into the trade, and have degraded it; being without conscience in the manufacture of their goods, they have, in a measure, debauched the dealers and made them co-conspirators in defrauding the public. While there are many honorable men in the trade, and quite as much integrity as formerly, the fact remains that there is still another class, lacking in all moral qualities, who have flooded the market with spurious wares and who thereby deliberately swindle the public. Indeed, so well calculated to deceive are some

of their products, that even dealers of experience are unable to distinguish them from the genuine, and thus innocently become the instruments by means of which the consumers are defrauded. These dishonest manufacturers injure the legitimate trade not only by bringing it into discredit, but they destroy the traffic in genuine goods by imitating them so closely in base metal that the sale of genuine goods is lost. The disreputable practices alluded to have almost made the name of jeweler a reproach and a byword, and he who owns to being in the trade, unless his actual standing is known, is regarded with suspicion.

But it is not alone the manufacturers who are to blame for thus bringing into reproach an honorable calling. They have their capital invested in the business, and are shrewd enough to produce just such goods as there is a demand for. If no jobbers would buy debased goods, there would be none made. But there are some who not only buy them, but give their orders just how far they shall be debased and how the swindle of the public shall be arranged. They order chains made of 10 or 12 karat gold with a 14 karat swivel, that they may sell chain and swivel together as 14 k; they order 14 k gold rings to be stamped "18 k," and sell them as 18 karat rings; they order watch cases to be made of a film of gold, loaded with base metal and steel springs, and sell the same as all gold. This leaves them a large margin for profit, but the manufacturer benefits but little by the transaction; these jobbers buy such goods at their true value, and sell them for their fictitious value. It is unfortunate that manufacturers of respectability, who regret this condition of the trade, are weak enough to yield to the demands of the unscrupulous jobbers, but they argue that if they do not make the spurious goods someone else will, and soothe their consciences by the reflection that they sell the goods at their true value, and if the public is deceived, it is the jobber who does it. This is very specious reasoning, deceptive to the one excusing himself by it, and that will not avail him when conscience calls him to an account. It is the reasoning of the counterfeiter, who makes spurious notes, but claims he is not a swindler because he did not utter them. If he had not made them they would not have been uttered nor the public swindled by means of them. It is just as well to call things by their right names. The dealer who knowingly sells debased goods for genuine commits a criminal act; he obtains the money of his customer under false pretenses, and is not only liable to him for damages, but may be punished as a criminal. The manufacturer who makes 14 karat goods and stamps them 18 karat, is a party to a criminal transaction, even though he sells them to the jobber as 14 karat goods. They are deceptive in their nature, and made for the express purpose of perpetrating a fraud, and the manufacturer knows it. He knows that the public will not knowingly buy the cheap grades of goods, and the only object in stamping them above their actual value is to deceive and swindle purchasers. Yet manufacturers and jobbers claiming to be honorable business men, are engaged daily in perpetrating these frauds upon the public, and it is not surprising that the daily press devotes time to exposing such transactions. Wherein are they morally better than the manufacturers and utters of bogus coin or counterfeit bank notes? The result is precisely the same in either case—the public is deceived into parting with its money for a spurious

article. We believe if some victim of such a transaction was to prosecute the jobber who sold him 12 karat goods for 14 karat, he would land him in the penitentiary; and if he were to go still further and prosecute the manufacturer, he would secure equal punishment for him. Gentlemen in the trade, it is well for you to look the facts square in the face, and view your acts from a legal standpoint. Stop soothing your consciences with specious pleas that you know to be fallacious, and set about reforming your practices. Put more conscience into your goods and less base metal into your melting pots. Make an effort to reform the practices of the trade, and to restore the prestige that formerly attached to your calling.

This is the work that needs doing. As to the means of doing it, what better agencies can be found than those associations that have been organized of late for the correction of certain abuses? Thus far these organizations have contented themselves with denouncing those jobbers who sell goods to outsiders at the same prices they sell to the trade, and who issue catalogues and price lists promiscuously. They have been fighting the pigny while the giant was devastating the country. The catalogue abuse was an annoyance, the outgrowth of dull times, but has so nearly ceased that it is no longer to be dreaded; with the return of prosperity, outsiders have enough to do in their own lines, and do not care to interfere with the trade of the retail jewelers. These abuses are virtually exterminated. At their worst, they were nothing compared to the crime of making and selling debased goods for genuine. These associations should now turn their attention to combating this greater evil, that has brought their calling into disrepute, and done more to rob them of their trade than all other influences combined. These associations are now powerful, having a large membership and a good working organization. If they undertake to purify the trade, they can do so. An effective way to do this is to refuse to be any longer parties to swindling the public. Let them demand with every bill of goods they buy, a certificate of the quality of the goods. If they buy chains, have it specified in the bill that the chains are 12, 14 or 16 karats fine, as the case may be, and see that it is not the swivel alone that is certified to; in buying cases, see that the bill certifies that they contain a certain weight of gold, exclusive of the springs and "stuffing." Make your jobbers specify the quality of every article, and then hold him to the letter if his certificate—for a bill of sale is a certificate, in so far that if the goods do not tally with the specifications contained in it, the seller becomes criminally liable for obtaining money under false pretenses. This will be a good beginning. Then let these associations bring their influence to bear upon Congress and secure the passage of a law establishing a standard for wrought gold and silver, and prescribing severe penalties for debasing this standard. Elsewhere we publish a synopsis of a law adopted in Switzerland prescribing such a standard, and this will furnish a basis for drafting a law for this country. This is the work that needs doing to effect those reforms in the trade that shall restore it to its former glory.

Our Workers in Gold and Silver.

AMERICAN art work in gold and silver has, very justly, taken a foremost place in competition with the workmanship of the old world. At the various exhibitions of the world's industry that have occurred of late years, the products of our artisans have been placed side by side with the work of European workmen, exciting the utmost astonishment at the wonderful progress we have made, and admiration of the poetic conceptions of our designers, and the skill with which they have been worked out by our artisans. At none of these exhibitions have American exhibitors failed to take first rank for excellent workmanship. This has been a matter of surprise as much to our own people as to European competitors, for few persons comparatively, outside of the trade were aware of the efforts that have been put forth in this field of industry during the past few years. It was natural for us to concede to the workmen of the old world, superior excellence in gold and silver work, for the nations of Europe

have many years the start of us in art education, and her museums are stored with the best examples of the skill of artisans of all ages, while her libraries are replete with the literature pertaining to the gold and silversmiths' art. Until quite recently, our manufacturers were content to copy the work of the old world artisans, and it is only within the last twenty years—or since the war—that attempts at originality have been made. The success that has attended the efforts in this direction has been really wonderful, considering the entire absence of anything like schools for the study of art. Our workmen have succeeded because it was in them to succeed, and not because of any special facilities set before them. Young men have entered our workshops to learn the trade of gold and silversmith, and while doing so, their inherent inventive faculties have been developed, and they left the old beaten tracks of their own volition, striking boldly out into channels of originality. It has been a common remark among our European competitors that our artisans certainly did good work, but that it was no credit to Americans, for the workmen were all Europeans. This was substantially true twenty years ago, but it is not true to-day. The very best workmen in the business, men possessing the rarest skill and the most comprehensive knowledge of the art, are Americans, born in this country, educated in our workshops, and developing their latent talent in strict obedience to that spirit of Yankee progressiveness that is irresistible. Some of the most elaborate work with which this generation is familiar, is the product of men who have never been outside of this country, and whose whole training has been in American workshops.

There is any number of ambitious young men connected with the trade who only lack opportunity and encouragement to develop into artisans that would be a credit to the country. Some means should be adopted to bring out this talent, and to stimulate young men to put forth their best efforts. Most of them are struggling with poverty, and are dependent upon their daily labor for the support of themselves and those whose natural protectors they are. Such progress as they make is made in the face of many discouragements. There should be a school of art established for the encouragement of the workmen in the business, where they would receive such instruction as would lead them in the right direction, and where they could have access to the literature of the art, to teach them what has been done by the master minds that preceded them. It would be a grand thing for the Jewelers' Association to found and maintain such an art school, but we scarcely expect to see this done, for the reason that the interests represented in the association are too varied and conflicting. In the absence of a common interest in the association in such special education, it is doubtful if such an institution is established, at least for the present.

But there is another means by which an impetus can be given to the development of artistic work in gold and silver, and that is by offering prizes for the best examples of special work. Last month we published a list of prizes offered by Goldsmiths' Hall, of London, for various kinds of work. These prizes were liberal in amount, and the competition was open to all British workmen. The Gorham Manufacturing Company, Tiffany & Co., the Whiting Manufacturing Company, Wood & Hughes, and other well known manufacturers, have established reputations for the beauty and excellence of their work. If they were to combine and offer a list of prizes aggregating, say \$5,000, the amount would be unappreciable to them, while it would prove a great incentive to many young men who are now prosecuting their work under difficulties, and with no special controlling thought or motive. A list of prizes offered for competition would arouse their ambition, and furnish the direction to their work they now lack, and a motive for putting their best intelligence and skill into their work. It would prove an incentive to develop talent in the workshop that, we do not doubt, would be attended by the very best results. In the perfected work resulting from such competition, the persons offering the prizes would find more than compensation for their expenditure. The example of Louis Prang in offering prizes for de-

signs for Easter cards, not only stimulated hundreds of artists to compete, but he found a profit in utilizing the designs furnished. The manufacturers above named are all paying large sums annually for designs for work; by offering prizes as we have indicated, they would greatly extend their resources in this direction, and give opportunity for new talent to enter the lists. The prizes offered by Goldsmiths' Hall cover a wide range of subjects, so that competitors have abundant room for the exercise of their imagination and for exhibiting their skill and dexterity. We have no hesitation in saying that a similar plan adopted by our leading manufacturers would serve as an inspiration to hundreds of ambitious workmen in the trade, and furnish that stimulus that is needed to develop them into true artists and first class workmen. The experiment once tried, we believe would prove so remunerative to its promoters that its annual repetition might be looked forward to with certainty. Next to a regular art school within the trade, a system of prizes for meritorious work is the best means that can be adopted for encouraging and stimulating the young and ambitious men in the trade.

Standard of Value of Wrought Gold and Silver.

WE print in other columns a synopsis of the Swiss law that goes into effect on the first of January next, prescribing the standard of wrought gold and silver goods. In forwarding to the State Department a translation of this law, Mr. Fish, our Consul at Berne, says, "it will remedy one of the greatest evils to which the Swiss watch industry has hitherto been subject, by furnishing a guarantee of the quality of the goods." The law provides severe penalties for violations of its requirements, and, if honestly administered, will put an end to frauds. It will also give the Swiss goods an advantage in the markets of the world as soon as it becomes generally known that their standard of value is prescribed by law, and that any deterioration of that standard subjects the offender to severe punishment. The effect of this law will be to guarantee the integrity of goods of Swiss manufacture.

THE CIRCULAR has been a persistent advocate for the adoption of a similar law in this country for the protection of honest manufacturers and dealers as well as the general public. So many fraudulent goods have been put upon the market of late by unscrupulous manufacturers, that the public has grown suspicious of everything having the semblance of wrought gold and silver. Deteriorated goods, having a semblance of pure metal about them, are brazenly put upon the market as twelve or fourteen karat goods, and sold as such. To such perfection has the art of debauching precious metals been brought, that even experienced dealers are deceived, and are made *particeps criminis* in the act of defrauding the public. The only remedy for this is a national law fixing a standard of quality, requiring that all goods be distinctly stamped in accordance with that standard whenever practicable, and providing severe penalties for fraudulent stamping. As there are many goods that could not, from the nature of their construction, be stamped, the law should require a certificate of quality to accompany each sale, any misrepresentation in the certificate to be punished as for fraudulent stamping. For this purpose, a bill of sale should be construed as a certificate of quality. Under such a law, a person receiving, for instance, a lot of seven karat rings that were billed to him as fourteen karat, would have a good cause of action for damages against the fraudulent sender, while the person guilty of the swindle could be prosecuted criminally as well as punished as he would deserve. Something is necessary to correct the many abuses to which the trade is now subject, and we know of nothing so well calculated to work a reform as the adoption of a national standard of quality. When frauds are made impossible, or can only be perpetrated in the face of criminal prosecutions, those unprincipled men who are now using an honorable calling to perpetrate their rascalities, would be driven to seek other fields for the display of their enterprise. The Swiss manufacturers have shown their wisdom by securing the enactment of a law

which virtually adds a government endorsement to their own representations of the quality of their goods. We hope the trade in this country, which has already endorsed the idea of a national standard of quality, will take active measures to secure the passage by Congress of a similar law during the coming winter.

A correspondent takes exception to the paragraph in the June CIRCULAR, setting forth what constitutes a diamond expert. Among other qualifications we said "he must have a full knowledge of the component parts of a diamond." Our correspondent asks "What are the component parts of a diamond, since the composition is pure carbon?" A pure diamond is pure carbon, and, consequently, has no component parts. But, unfortunately, *pure diamonds* constitute but a very small proportion of the diamonds of commerce. Let us ask our correspondent, if the diamonds of commerce have nothing in their composition but *pure carbon*, how comes that there are so many different colors in diamonds? There are yellow, pink and rose color diamonds, and diamonds with specks in them. All these must have something in them besides pure carbon, otherwise they would all be of precisely the same color, the same degree of hardness, and possess the same specific gravity, which is not the case. The color of a diamond is imparted to it by some foreign substance, and the amount of such foreign substance affects the value of the diamond. In the trade diamonds are spoken of as "perfect gems," or as being "off color," etc., showing that the trade recognize in diamonds substances which are not carbon, but that have weight in determining their value. The sarcasm of our correspondent is lost when he says that there is not one expert in the country who can tell the component parts of a diamond. There are many such, professional mineralogists, who can tell of what the coloring matter of diamonds is composed; and there are many more who cannot tell what such foreign substance is, but can tell to what extent it depreciates the value of the gem. It was especially to this coloring matter in diamonds that we referred when we said that a true expert should be able to tell the component parts of a diamond.

WE have referred several times of late to what is known as "the drummer tax law of Texas," which imposed a special tax or license fee upon traveling salesmen. We are assured that the legislature has amended this law, whereby the tax is made to bear equally upon traveling and resident salesmen. We have not seen the law as amended, but are assured this is the purport of it. If so, it makes the law constitutional, and in accordance with the decision of the Supreme Court of the United States, on which we commented last month. The Court held that any state law imposing a tax upon non-residents that was not shared equally with residents of the state, was unconstitutional, because it imposed restrictions upon inter-state commerce, the freedom of which is secured by the constitution of the United States. The Court, however, declared that the state had a right to levy taxes as it saw fit, provided no discrimination was shown in favor of resident dealers. This is all the trade wants—"a fair field and no favor." Competition on equal terms is the most anyone can expect. If Texas dealers are compelled to pay a tax on their business, or to take out a license, it would be unfair to exempt travelers from such taxation.

A few weeks ago, an enterprising jobbing house announced an important change in the method of selling watch cases. Their plan was to sell cases at the net price of the gold contained in them, to which was added a reasonable price for making. It had heretofore been the practice to charge the spring and other base metal in the case at the price of gold. While there was, it is true, a reduction in price because of the spring, etc., yet the public was led to believe that it was buying a certain number of pennyweights of gold, when, in fact, a large portion of the weight was made up of base metal. This pernicious practice left the door wide open for unscrupulous jobbers to swindle retailers, and they were not slow to take

advantage of the opportunity. The old practice of loading up cases did not benefit the makers to any great extent, for that class of jobbers who sell 14 karat goods with an 18 karat stamp, were willing the makers should load the cases with as heavy springs and as much brass as possible, provided they could participate in the profits. By thus participating in the swindle, the profits of which came to them in the nature of a concealed discount, the unscrupulous jobbers surrounded themselves with an armor which their more conscientious neighbors could not penetrate. It was this pernicious practice that did more to demoralize the trade in cases than all other causes combined, and for months past there has been no bottom price on cases. The new plan, of selling cases at the price of the gold actually contained in them, with a reasonable price for making added, leaves out altogether the element of fraud, and is an honest and upright way of selling a case. This method must, sooner or later, be universally adopted by the trade.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the exclusive official paper of the Jewelers' League, and has been selected for the publication of all matters of interest relating to it. We therefore devote this column to the interests of the League and its membership. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will be herein answered. Address *Jewelers' League, Box 4001, P. O. New York*, or the office of THE CIRCULAR.

Since the last issue of THE CIRCULAR the sixth death has occurred in the membership of the League, since its organization in June, 1877, that of Joseph J. Acheson, of Brooklyn, N. Y., membership number 25, who became a member on the 20th day of June, 1877, the month in which the League was founded. Mr. Acheson's death was anticipated for some weeks prior to its occurrence, his physician having determined that the growth of the cancer on his tongue would ultimately result in his death; its development thus giving the members of the League and others an opportunity, which they availed themselves of, to show by their delicately tendered offices and their recognition of the bond which unites the membership in a practical brotherhood in times of affliction. The proofs of death were presented at the regular meeting of the Executive Committee, held on July 1st, and having been satisfactory, the amount in the benefit fund, \$2,498.55, was immediately ordered to be paid to his beneficiary, and a check for that amount was paid to his widow on the same day. The absence of equivocation or delay and the promptness of the payment of the benefit need no comment, and the action of the Executive Committee in such cases receives exceedingly gratifying endorsement by the many members who are heard to speak of it, each seeming to feel, not so much that he is being assessed, as that he is cheerfully doing to others as he would that they should do unto him. We many times hear the remark humorously made, that one would rather pay two dollars for someone else, than to have that someone else pay it for him, and that is about the way we feel ourselves.

An assessment of \$2 upon each member has been ordered, notices of which have been forwarded to members, and we direct attention to the notice that the time for the payment of the assessment will expire on August 6th; all members who do not respond to that date will be dropped from the roll.

Since our last report the following named gentlemen have been admitted to membership.

H. C. Barnum, Syracuse, N. Y.; W. N. Brunner, Philadelphia, Pa.; H. W. Burdick, Cleveland, Ohio; G. E. Dorrance, Newark, N. J.; T. F. Duffy, B. Eckstein, Josiah Green, L. Kaufman, New York City; W. L. Estelle, Chicago; James Fitzpatrick, New York City; F. P. Hall, Taunton, Mass.; J. Hansen, Washington, D. C.; Rudolf Jacobs, Cincinnati, Ohio; E. A. Johnson, Rome, Ga.; C. W. Jones, Salem,

Mass.; M. Kohler, Pomeroy, Ohio; Max Kuner, Denver, Colo.; H. C. Kuschke, Philadelphia; Everett Lane, Walpole, Mass.; James McKee, Pittsburgh, Pa.; Charles Minchew, Taunton, Mass.; George Needham, New Bedford, Mass.; L. E. Saxton, Milford, N. Y.; E. E. Shertzing, Mahanoy City, Penn.; Otto Stoelker, Montgomery, Ala.; T. H. Weld, Lockport, N. Y.; A. Witzel, Pittsburg, Penn.; D. F. Wetzell, Ravenna, Ohio.

Admitted July 1st, 1881:

E. Rosenthal, Charleston, S. C.; G. S. Keiper, Ashland, Penn.

The Awards at the Melbourne International Exhibition.

THE awards made to manufacturers of watches at the Melbourne International Exhibition have excited considerable comment in the trade, both in this country and in Europe, and some bitterness of feeling. The following extract from the Melbourne *Argus*, the leading daily paper of that city, of May 3d, explains the embarrassment under which the committee labored, and their efforts to arrive at a wise and just conclusion:

"An important result was arrived at by the Executive Committee yesterday in regard to the medals to be given in connection with awards obtained for collective exhibits, *i. e.*, the joint exhibits of a number of individual firms or companies. In certain cases manufacturers have combined in order to produce a good impression on the public, and to make sure of one or more high-class awards. Obviously, however, it would be unfair to manufacturers who had sufficient confidence in themselves to enter the competition singly, to pit them against a host of opponents collected into one body. The Committee decided that collective exhibits of the kind named should receive medals, and that gold or silver medals should only be given to individual exhibitors. For example, the watchmakers in the Swiss court (32 in number) entered their goods as one exhibit, and by this union of forces—the nice workmanship of one, the time-keeping qualities of another, &c.—won first-class honors. Against them there competed individual exhibitors from England, France, Victoria, the United States &c., and out of this number only the Waltham or American Watch Company obtained an award equal to the one gained by the combined Swiss makers. The combination will receive a service medal (the class of medal awarded to Governments, public departments, and commissioners), and the individual exhibitors a medal of the quality their watches are considered worthy of. Had the same kind of medals been given to both parties, each of the 32 Swiss exhibitors might have been entitled to say he had won the (gold or silver) medal, though as a matter of fact the prize was only given for the best article in the whole collection. For the sake of the Swiss exhibitors themselves, it seems a pity that they did not enter the competition in the same way as the rest of the world, and thereby carry off 32 individual awards (if entitled to them) instead of one only, which none of them can claim as his own, because his share in it at most can only amount to one thirty-second part."

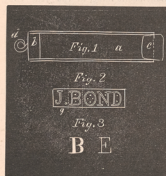
From the above, it will be seen that the exhibitors who went into the various combinations were barred out as individual exhibitors. Had each one stood on his own merits, he would doubtless have obtained recognition according to the actual worth of his exhibit. This seems to be the only fair and just method of obtaining competition between individual makers, and the lesson taught at Melbourne in this respect should be heeded by the trade in future competitive exhibitions.

DOUBLE-PENDULUM clocks for show windows, &c., may be constructed by riveting a wheel upon the verge arbor, which drives a pinion fastened to the seconds pendulum. When one pendulum makes a motion to the right, the other one must necessarily swing to the left. The motor power, of course, must be increased. Such a clock is of much effect in a window.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH.

A knowledge of how to make a name stamp, or a small die, is of consequence to watchmakers; not only can it be used as a source of profit, but there are many ways in which such knowledge can be useful to the general workman. As for instance, a name stamp for brass checks, to mark tools, and for many other things. In order to make a good job expeditiously, the steel must be very soft. The method described here is one I think originally patented by a bank note engraving firm, of the title of Spencer, Perkins & Co., early in the present century. Of late years the modified process has been extensively practiced by the American watch companies. It is no secret in one sense, still it is comparatively little known in the repair trade. The idea is to enclose pieces of steel to be softened, in a close iron box, filling the interstices with pulverized charcoal. The details are conducted as follows. Procure a piece of iron tube 6 inches long (wrought or water pipe) and $1\frac{1}{4}$ or $1\frac{1}{2}$ inches in diameter; have a plug of iron welded into one end, and a loose plug inserted into the other. The loose plug needs no turning or fitting, but can be left as it comes from the hammer, as the plug must be plastered in. Enough charcoal should be pulverized to fill the tube; a large piece of tin grater ten or twelve inches long by four wide, such as is to be found in every kitchen, will speedily reduce a lump of coal to dust; spread down an old newspaper to grate the coal on and also fill your tube. Old files, either whole or broken, or forged pieces of steel are packed into the tube with the dust, leaving ample space between and around the pieces for charcoal dust. Hold the tube upright and tap on the side with a hammer, so as to jostle the dust into all the interstices. Leave just space enough on top for



The tube should be put into a moderately warm place to dry the clay, as too rapid heating would cause it not only to crack, but be blown out by the steam. The tube should now be put into a charcoal fire and heated up to a cherry red, and kept at this temperature for a full hour, when it should be put into a mass (a peck at least) of hot ashes and allowed to cool slowly. A common hard or soft (stone) coal fire will answer, if you are careful to not let the tube get too hot; and it should be turned so as to get it hot alike on all sides. The whole process in a nutshell is, to heat the tube and its contents through and through to a full red heat, and then putting it into a position to cool very slowly. As a rule, the tube, if put into a mass of hot ashes, (coal or wood ashes) should at the end of twelve hours be hissing hot, or at least so hot as not to be held in the hand. Steel treated in this way is softer than iron, and much crisper; turns well, drills easily, can readily be sawn with a good saw, and a graver cuts it with great facility. The same box, or tube can be used for hardening dies and tools without scale; to do this, suppose you have a name stamp you wish to harden. But here let me remark that this process (of hardening) is better adapted for a large lot of small pieces which you may wish to harden, than for a single piece like a punch, as such an article can be amply protected by any of the many anti-scaling compounds sold by our material dealers. But for such pieces as stem winding wheels, or any steel piece with crevices and

corners, the process is invaluable. We will continue with the idea that it is a name punch which is to be hardened. After it is complete pack it into the tube with charcoal dust as for softening, omitting to plaster in the plug c with clay. The tube is brought to a full red heat and kept so until red hot through and through. A piece of No. 8 or 9 wire, two feet long, is made into a hook at one end, for hooking into the loop d ; this loop is screwed into the plug b for this purpose. A bucket holding at least a gallon of water is provided; the water should be about 60° F. Hold the tube over the bucket of water by the wire and ring d —the lower end of the tube should be quite close to the water. Strike the tube so as to jar out the loose plug c , which will of course fall into the water; if the punch and dust don't fall out, tap the tube and it will fall amid a shower of sparks into the water; the burning coal dust effectually protecting the punch from the air while falling. If the process is carefully conducted as described, the punch or whatever articles in the tube will be found in the water very hard and hardly stained. Indeed, so perfect is the protection, that a piece of steel which has been blued before putting into the box, will come out bright and white, the hot charcoal actually robbing the blued steel of the oxygen held in the blued surface. Of course the articles so hardened are too hard for anything but a file, and must be run down with an oil bath or by color over a lamp. Any blacksmith can forge a rough stamp for you, and you can soften and get it into shape. Pieces of old bench files make good name stamps with but little shaping. With steel so softened, lots of tools can be made, especially cutters for cutting wheels for stem winders; but steel cutters will form the subject of another article; but as it is impossible to succeed without steel softened as described, particular mention is made here. In finishing the stamp for cutting, the face should be stoned with an Arkansas stone, and left a trifle wider than the face of the letters to be cut—that is to say, if you are to cut a letter $\frac{3}{4}$ of an inch high, let the face of the stamp measure $\frac{7}{8}$. The method here described will be found to be the best course for a person who only practices it occasionally; and gives very satisfactory results. Stamps of a fair sized letter will be found easier for beginners—about $\frac{3}{4}$ of an inch say. After the face is smooth and true, rule with a sharp, keen point two lines exactly $\frac{3}{4}$ of an inch apart; between these lines the letters are to be designed. A fine pointed steel pen and common writing ink can be used; let the ink lines be as fine and distinct as possible—if any greasiness prevents the ink from flowing, wash the punch with soap and water. After the design is satisfactory, take a common graver and go all around the letters as shown at Fig. 2, leaving the face of the letter intact. This outlining is not used by the professional stamp cutter, but the novice will save time and produce a much better job by adopting it. After going round the letters with a graver, the face should be stoned off and the lines corrected and perfected until an even and continuous line surrounds each letter, and presents the face of each letter perfect. The problem now as it presents itself is simply to preserve the face of the letter as it presents itself, and remove all that stands outside the lines. The letters do not want to be full faced as shown at B, but thin outline letters like E, Fig. 3. The surplus metal can be removed by cutting across with an edge file as at g , Fig. 2, and by drilling. Drill holes should be quite shallow; it is one of the mistakes of beginners in stamp cutting, raising their letters too much; and this leaving the face of the letter too broad must be regarded against; also making the cutting angle of the letters too small; 45 degrees for soft metal and 60 degrees for hard metal. Small cold chisels both flat and round are used; and here you will find the great use of the graver outlines, the little chisels will start correctly from them, and just exactly where you want them. Round chisels are made of pieces of wire, the end turned to the different sizes required, and simply beveled. For letters $\frac{3}{4}$ of an inch long, a space or face $\frac{3}{8}$ of an inch is quite sufficient; and for smaller letters still less. But in all letters a distinct face should show between the graver outlines; if this rule is not adhered to you will find some of the letters will be cut away too much and will not make a sharp impression. You can test your punch in sheet lead before hardening. Filing removes most of the metal outside of the letters, and chisels and drills inside. Round bottom and other shaped gravers are also useful.

Abraham Louis Breguet.*

[A BIOGRAPHICAL SKETCH BY D. U. in *Allg. Uhrmach. Ztg.*]

WHAT a volume of incentive contemplation to the growing watchmaker is connected with the honored name of a man who, among the horologists of Europe up to our time, has been one of the greatest and most skillful masters.

Born in want in the year 1747, in Neuenburg, Switzerland, whither his father, who was a merchant, was forced to fly from France for the sake of his religion, he showed even in earliest childhood a deep interest in the art of horology, which stood in high repute in his native town. The parents decided to let him learn watchmaking, but the father died when the boy was barely eleven years old, leaving the widow and child in misery.

Misfortune, however, has often been the incentive to genius; and so it was in this case. The mother, after a lapse of a year, married a watchmaker, who enjoyed universal esteem on account of his moral qualities, and the youth accepted with joy the invitation of his stepfather to become his apprentice. But the monotonous, sedentary pursuit, the regular and strictly inspected work of the workshop was little relished by him, and the actual progress made did not justify the high expectations entertained of him. In fact, he made no progress, and who knows if this great genius might not have disappeared altogether under existing circumstances, if his stepfather had not resolved to leave Neuenburg, and go to Paris. When the change was accomplished, he article his stepson to a watchmaker in Versailles, for further information, who was a very eminent master of the art, and who, as soon as he happily recognized the inherent qualities of the boy, began to develop and cultivate them, so much so that even after a short period in his workshop a complete change had taken place in him. Labors which had been once his detestation, became his pleasure, and manipulations, which with all possible endeavor, could not be mastered, were acquired in a short time without exertion. All his capabilities suddenly developed, instigated by the love and confidence which his master ever demonstrated for him, in a most surprising manner.

Within a few months after completing his apprenticeship of three years, he had the misfortune of losing both his parents, and the duty developed on him at so tender an age of providing for his younger sisters and brothers. And how diligently and untiringly worked the young man. He bore with pleasure every privation to support them in honor.

Although an excellent workman, he felt himself deficient in astronomy and mathematics, without which he considered it impossible to arrive at a greater perfection in his art. He commenced a still greater degree of frugality, and shunned the most trifling expenses for the purchase of pleasure, and this, united to an untiring diligence, soon enabled him to enroll himself in the class of Professor Morin, in the school of Mazaran in Paris.

But the unassuming and knowledge seeking young horologist did not long remain hidden to the celebrated professor; he soon singled him out from among his scholars, not alone by the distinguished praise which he paid to the works of the young artisan, but also by the still greater honor of establishing personal relations with him. And nothing more decisively influenced Breguet's future great achievements both as horologist and as a mechanician than this intimate relation which sprang up between the great man of letters and the young watchmaker, who recognized in the study of theory the securest means of elevating himself beyond mediocrity in his calling.

After having worked for a number of years in the different workshops of Paris, he purchased, with his savings and the assistance of his friends, a small house in the vicinity of the hotel de ville, and

commenced business on his own account. Although very excellent in his pursuit, he was far from enjoying a European fame.

His celebrity was mainly due to a watchmaker Arnold, in London, who with mere disinterestedness assisted him with all means at his command. The French Revolution caused the young man to leave France for several years; he went to England, and engaged himself uninterruptedly with watches so extremely valuable for their assistance to mathematical sciences.

When the internal affairs became settled, he returned to Paris, and his endeavors not alone brought him fame, but also, what happens more seldom—wealth. He was appointed horologist of the marine, and finally was accepted as member of the Royal Academy of Science—an honor which is so rarely bestowed. Henceforward, his fame spread. Beside his astronomical clocks, which are diffused in the observatories of all parts of the world, he manufactured artistic clocks and watches, adorned with the most splendid ornamentations and cases for the kings and potentates of Europe. A large collection of clocks and watches of all kinds made by him, is preserved in the Tulleries in Paris, and Versailles.

In the workshop, Breguet was solemn and silent, a pattern, in every respect, for his workmen, but in social intercourse he was genial and amiable, and was much sought for and respected in all the upper circles of society.

He corresponded with the greatest mathematicians and philosophers of the age; no scientific man of eminence ever left Paris without having paid him a visit.

But the man ever remained simple, frugal, and unassuming in his surroundings; the small cottage in which he founded his business, remained for fifty years his beloved home and workshop.

He departed in the full enjoyment of his fame, in the year 1823, highly honored by his colleagues, and deeply mourned by all those whom he had in the most manifold branches of industrial pursuits, assisted both by deed and counsel.

A Diamond Tester.

A correspondent tells of an amusing incident that occurred on a train that was crossing the Rocky Mountains: A traveling peddler undertook in the cars to sell a large "diamond" ring to a miner, who had his pile.

"Humph," said the miner, after critically examining the ring, "they've got common stone up in the diggings where I've been that'll cut that diamond all to pieces!"

"If you'll find a piece of stone that will cut that diamond I'll give it to you," replied the peddler.

"All right," said the miner, "if I can't cut that diamond with a stone I'll buy it of you."

Thereupon the miner took the ring in his hand and pulled from his vest pocket a small piece of brown-looking stone, similar to a bit of dark free stone, except the grain was very fine, and with this he proceeded coolly to cut and scratch the "diamond" with several ugly-looking gashes. A group of passengers that had gathered about the miner were amazed, but, while they smiled the peddler with his "diamond" withdrew discomfited.

"That little piece of brown stone," explained the miner, "is a piece of corundum that I got in the Rocky Mountains, and its the best diamond tester in the world. It won't scar a genuine diamond but it will verily cut up pieces of glass or quartz."

*NOTE.—Saurier expresses himself with some degree of ill nature on this occasion. He says: He was gifted with an inventive talent and a taste for complicated things, which called on the imaginative faculties; he was gifted with adaptation, and since he had the necessary talents, this artisan, in whose workshops the first workmen of Europe were united, as watchmaker enjoyed during his lifetime the greatest renown of the century. He was even member of the Society of Sciences, although his knowledge was inferior to that of other great horologists, who either were his contemporaries or predecessors—Pierre Leroy, F. Berthoud, and A. Janvier.

*NOTE.—It appears that this is the original orthography of the modernized name Breguet.

The Balance Spring—Its Consistency and Properties.

Translated for THE JEWELERS' CIRCULAR from EM. BERG, in *Deutsche Uhr. Ztg.*

THE first application of the spiral form spring dates back to the sixteenth century; although the watches made at that time were simply considered toys, and persons of high rank used them for presents.

Only in the year 1673, Christian Huyghens, a celebrated Dutch mechanician, developed the balance spring, and introduced it as a regulating agent into the watch.

Everyone, even he who is not acquainted with horology, knows that the balance spring is commonly made of steel—a metal which is a peculiar combination of iron and carbon; but this very fact signifies that peculiar methods must be employed to produce this combination. The methods of producing steel are manifold, but may be divided into four classes.*

For the manufacture of delicate steelware, such as parts of watches, cutting and other instruments, etc., only cast steel is used, made as follows: In a smelting furnace built for the purpose and connected with the chimney, to obtain a good draught, crucibles are placed, generally of a capacity to hold about 15 kgm., and provided with a tight-fitting cover; all around within the furnace is filled with small pieces of hard coke. When the fire is in full blast and the crucibles are glowing, they are taken out and filled with small pieces of common steel, and the covers are replaced, to prevent the admission of air. When the steel is melted the crucibles are taken out and the metal poured into cast-iron forms; the metal thus receives a homogeneity which cannot be produced by any other means. If a piece is suddenly fractured, it will exhibit a finely-grained texture without brilliancy, thus denoting its high degree of toughness. Although this process is very costly, as the crucibles cannot be used more than about three times, and the workmen receive higher wages, yet the difference in price cannot be placed in the balance with the results thus obtained.

The properties of steel, that it may be tempered and annealed, are well known to the watchmaker. It is tempered by heating and plunging suddenly into cold water, oil, or mercury, to obtain a quick cooling, or, as is done with reamers, which are plunged into a bath of molten lead, and left to cool in the atmosphere. By hardening, the circumference of the steel gains about 0.02; its elasticity has disappeared, and it is prone to break by a careless bending. How was it overcome? The question may be answered thus: The outer layers of the molecules of the steel have assumed a proportionally less vibrating condition than the inner one, and an unnatural tension is produced in the metal. A significant difference will be found between tempering in water and oil; if the latter fluid is used, the steel will be less brittle, because the specific heat of oil is less than that of water, and consequently the oil will draw out less heat from the steel, thereby permitting the molecules to assume a conformity more consistent with their nature.

Kirkaldy, in his *Experiments with Crude Iron and Steel*, arranges into a table the results obtained of the different degrees of temper, by submitting steel rods to an increasing tension, until they broke. I am free to borrow the following from his experiments:

	Breaking wgt. in tons per 25 square inch, mm.	Expan- sion, per cent.	Character of fracture.
White heat, cooled in water	30	0	Granular throughout.
" " " slowly	36½	22	Fibrous
Red " " in oil	53	14½	1-3 granular, 2-3 fibrous.
White " " " "	58	2½	Nearly all fibrous.

In this condition, steel is almost useless for mechanical purposes, but by following the above process at a lower temperature, its elasticity is regained, and the hardness of the steel thus stands in an in-

*NOTE.—[The process of making common steel is so widely understood that a translation was deemed superfluous.]

verse ratio to the temperature applied. It may be applied in different ways, say, by lead and tin, used in different proportions which begin to melt at a known degree, and which serve as plunge bath for the steel.

It is perhaps superfluous to state that during the entire period in which the lead is fluid, its temperature remains the same. It melts at a temperature of 320° C. When put into the crucible for the operation, it possesses the heat of, say, 16° to 18° C. The constant action of the fire raises the temperature from minute to minute, until 320° C. are recorded by the thermometer. Thenceforward no change will be registered by the latter, but fusion ensues. Since the fire does not lessen its action, it would appear that the heat is lost, which, however, is not the case, because it is simply imbibed by the metal, whence follows that if a body requires to be melted, it must imbibe a certain amount of heat, which produces no thermometric deviation. This apparently wasted heat was in 1787 observed by Dr. Black, and by him theoretically treated; he called it latent heat, under which appellation it is still known.

A lump of melting lead, thrown into water, solidifies, and raises the temperature of the water, because the metal solidifies and parts with its imbibed or latent heat.

Some steel workers rub the steel with tallow and observe the effect of heat upon the latter.

The elasticity of steel is best recognized, however, by the beautiful colors produced upon its polished surface. When a tempered and polished piece of steel is submitted to heat, a thin covering of oxidized iron forms upon its surface, by the combination with oxygen; it possesses the property of decomposing light; at a temperature of 200° C. it assumes a pale yellow color; the longer the heat operates upon the steel, the thicker will become the lamina and the higher the temperature, which is betrayed by the change of color, until at last it becomes greyish blue, which occurs at a temperature of 320° C. Thenceforward, the layer will become so thick as to absorb the light, the color changes to grey, and no more changes take place. The following table exhibits the effect of the different plunging methods:

Temperature.	Color.	Mixture of Metals.		Appearance of Tallow.
		Lead—Parts	Tin—Parts	
200° C.	Pale Yellow	7	4	Begins to Smoke.
218	Yellow	8	4	Smoke.
234	Straw Color	8½	4	Increasing.
245	Nat. Brown	14	4	Thick.
262	Purple	20	4	Black.
290	Light Blue	46	4	Ignites.
310	Dark Blue	50	4	Burns.
320	Grey Blue	Lead Alone		Consumed by Flames.

Commercial balance springs generally have a blue color. Since the introduction of palladium springs, however, some watchmakers think it *à la mode* to whiten them by grinding; they are varnished afterward to protect them against rust, etc., which gives them at the same time a palladium appearance.

The balance spring manufacturer purchases the already prepared steel ribbons. When desiring a cylindric spring, such as is used for chronometers, he wraps the ribbon around a brass drum, with a hole two-third of its diameter, and fastens both ends by means of screws. He next incloses the spring in a fitting copper tube, and places it into a small metal box filled with charcoal. This box with its contents is heated to a glow heat; the drum containing the spring is now withdrawn, the copper shell taken off, and the drum with spring plunged into mercury. The spring is hardened by the operation, and assumes a handsome white color; it is next ground and polished. When done, the spring is wrapped around a somewhat larger drum, provided with a spirally wound shoulder, of a breadth of the steel ribbon. It is next annealed, and takes the shape of the last drum.

The most important property of a spring is its elasticity, or, in other words, its peculiar property to regain its former position if one of its parts was forcibly deflected therefrom.

Let us examine this so simple appearing action somewhat closer,

and for the sake of clearness, let us suppose a part, represented in

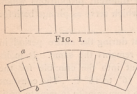


FIG. 1.

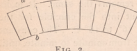


FIG. 2.

happen only if the molecules possess a property which enables them to resist both being pressed and expanded. To be better understood, I will call the branch of physics, governing molecules, to my assistance.

Take a sponge and press it from all sides; its circumference becomes materially lessened, being porous; open the hand, and the sponge will regain its previous dimensions. As an illustration of the same thing, take a glass cylinder closed at one end; insert into it a piston fitting air tight, and which at the commencement of the experiment is 20 cm. from the closed end. Push the piston into it by 10 cm., and the air will become compressed one-half its bulk, which leads us to the conclusion that the latter must have air cells like a sponge, or that there exists a vacuity between its atoms or molecules which permits this compression. All substances capable of being compressed, no matter how great the exerting power, or how insignificant the result obtained, must, of necessity, consist of molecules, divided by vacuity. Thence follows the theoretical deduction, "All substances solid, fluid, or gaseous, consist of molecules which move with a velocity peculiar to themselves, in all directions, and adhere to each other by the power of cohesion."

It is known that when the temperature of substances is raised sufficiently, they will expand, with but few exceptions, of which gutta serena is one, and if heat is applied with sufficient intensity, it is capable of changing a solid mass into a fluid one, and from this even into a gaseous state; in other words, heat is capable of dividing the molecules of a solid substance in such a manner that they further and further repel each other, and the space between them increases accordingly. This peculiarity is elasticity. The molecules separate when the exerting power, which was present here in the shape of a low temperature, discontinued.

Take a bladder, containing a quantity of air, close its orifice, and warm it before a fire. Its creases will disappear and its form become more rounded. The heat, produced by the fire, was, like light and sound, propelled through the air in undulating or wave-like motions, reached the bladder and raised its temperature as well as that of the gases confined therein; consequently, the velocity with which the molecules moved became accelerated and the amplitude of their oscillations was increased, which caused a continuous dashing against the bladder, rendered visible to us by the increased swelling.

Such an elasticity may also be produced when the temperature remains normal, but a muscular force is the power exerted. The reader will remember, when we inserted a piston into the glass cylinder the bulk of air was compressed from 20 cm. to 10 cm. An increasing consumption of power was noticeable the more the air was compressed, and which increased with a certain ratio; that is, the nearer the piston approached to the end of the cylinder, the greater the resistance offered to its penetration. But this was produced by its molecules; they moved within a certain vibrating limit peculiar to them, which was not changed by the contracting space, but they were more frequently driven against the sides, owing to the contraction of space. Now, it is clear when the compressing power ceases, which retained the piston in its position, and its springs back to its former place, that this power is generated by the energy of the molecules. This power thus described is analogous to that of the inner side *a* of Fig. 2. It was said in the preceding that a sufficient intensity of heat would produce a change in the homogeneity of a

substance; if, therefore, the heat discontinues, that is, the temperature of the substance is lowered, by which a part of the energy of the molecules is overcome, it is possible to reduce, with sufficient pressure, the gas to a liquid. Until 1877 several gases were considered "permanent," when M. Pickett, of Geneva, and M. Cailletet, of Chailon-sur-Seine, demonstrated that it simply depended from the degree of temperature and pressure to convert all gases into fluids. They reduced oxygen, hydrogen, and others. In the apparatus of M. Pickett, a temperature of -140° C. could be obtained, and for the conversion of oxygen a pressure of 300, of hydrogen, one of 650 atmospheres were necessary to reduce them to a fluid state.

It is accepted, therefore, that the limit of elasticity of a gas has been reached when its molecules are compressed thus that an attracting power unites and at the same time prevents them from resuming their previous condition. The limit of a fluid, however, is reached when its molecules are so intimately connected as to form a mass, and whose attractive force becomes so strong that its molecules offer a great resistance to a forcible expansion, and seek to become re-united.

This explains the molecular condition of side *b* in Fig. 2.

The power of nature which unites these molecules so intimately may be beheld everywhere throughout the vast universe; it is that which the Allwise Creator has placed as primal condition into everything corporeal. Under the name of attraction of gravity, it unites the universe into one entity; under the appellation of cohesion it binds together the smallest atoms; as elasticity it becomes perceptible to ocular demonstration, and it is heard in the sounds produced by the vibration of disturbed molecules of bodies musical strings.

The balance spring, consequently, is endowed with an energy which thoroughly fits it for the purposes of a time meter. It governs the rotating motion of the balance, and is even capable of making isochronous its vibrations, if the watchmaker knows how to develop this property.

Thus much to-day of the consistence and conditions of the balance spring.

AN excellent gold varnish which gives bronze the color of gold is prepared in the following manner: 3 oz. bright gum-lac is dissolved in 2 pounds best alcohol, and tintured either with annatto or gamboge; the first gives it a handsome dark gold, the latter a lemon-yellow color. The bronze to be treated is slowly heated over a fire of charcoal, left to cool a little, and then dipped in a mixture of 3 parts water and 1 part nitric acid, and left in it until entirely black, which requires time of about one or one and half hours. Then take it out, brush it with a stiff brush, and dip into strong nitric acid; seize it with copper tongs, as those of iron and steel are very injurious. When the black coating of the first immersion has entirely disappeared, take out the bronze, rinse it off clean in lukewarm water, and dry in sawdust. The operator must be cautioned that the smallest part of iron in the bronze will ruin the whole piece, by showing itself in the shape of a large black spot, which cannot be removed or covered. When the piece has been thus treated, it is laid upon a red-hot iron plate, until so hot that it would burn the hand. Apply the varnish in one or several coats.

A PROCESS to separate the silver from plated copper is used at Birmingham, which is well worth to be universally known by goldsmiths. A nitro-muriatic acid is made use of composed of eight parts concentrated sulphuric acid, in which one part of pure saltpetre has been dissolved. This solution is diluted with double its weight of rain-water. The plated copper is placed into a glass vessel, the acid is emptied into it, and heated from 30 to 35 deg. Reaumur, which it must not exceed. The silver is dissolved in the fluid, while the copper almost remains untouched. To obtain the silver, add salt dissolved in water, as long as a snowy deposit is made, which is chloride of silver. Decant and sweeten with water, and add double its weight of finely pulverized, dried potash, put it into a crucible, cover it with salt, and heat it little by little, until it fuses. When cold, break the crucible, and you will find a lump of pure silver at the bottom.

Jewelers Day in Providence.

PROVIDENCE and New York each boast of a base ball club, composed of gentlemen connected with the jewelry trade. Two years ago, the Providence club invited the New York club to visit that city and play a game of base ball. The invitation was accepted, and the New Yorkers, although beaten in the game, were royally entertained by their hosts. Last year the return game was played in this city, the New York club returning conquerors from the diamond field, and also having won an enviable reputation for being excellent entertainers. These games naturally excited great interest in the trade, not so much because of the excellence of the playing of the clubs, but on account of the opportunity it gave the jewelers of exhibiting the social side of their natures and their capacity for enjoying a holiday. Hence the annual base ball game has become an event of great importance in the trade, and is looked forward to with pleasant anticipations by old and young, employer and employed.

According to arrangement, the third, or conquering game, was played at Providence July 6. The fact that it was the third of the series, and was to determine which club was "the best man," and the further fact that the winner was to receive a massive silver plated water set, mounted on a chariot, manufactured especially for the occasion by Holmes, Booth & Haydens, lent an added interest to the event. Providence termed it "Jewelers' Day," and the local trade virtually suspended business, and gave itself up to the full enjoyment of the festivities. And richly were they and their guests repaid, for the arrangements for their entertainment were perfect in every detail, and a more enjoyable day could scarcely have been devised. But to proceed with the details.

The New York Jewelers' Club was notified to assemble at the Astor House, with their invited guests, at 3:30 P. M., of the 5th, preparatory to embarking on the steamboat *Massachusetts* for Providence. About 150 persons in all responded to the call, and, under command of C. D. Marsh, President of the Club—who was ably assisted by F. A. Bliss, Vice President, B. W. Ellison, Marshal, and aids Dyer Brainerd and E. A. Bliss—they were soon formed in line. Preceded by an escort of police from the 27th Precinct and a brass band of twenty pieces, the column passed down Broadway, through John and Nassau streets and Maiden Lane—the headquarters of the trade—to Broadway and thence to the foot of Warren street, where they embarked on the boat. The trip up the Sound on that warm, delightful evening was charming, and the refreshing breeze from the Sound was greatly enjoyed by the New Yorkers after their long, dry march. Members of the Club and their friends beguiled the time smoking and telling stories, or listening to the songs so feelingly sung by C. Booth, C. Champenois and Ed. Baker—who were recent sojourn at Egg Harbor seemed to have lent pathos and sweetness to his voice. The songs were varied in their nature, covering the entire range of national, patriotic, sentimental, and comic, all of which were greatly enjoyed by the assembled crowd. Capt. Ray Allen, and the other officers of the *Massachusetts* contributed greatly to the comfort of the party by their uniform courtesy and attention. At an early hour the party retired to rest, that they might be fully prepared for the struggle of the next day.

Among those accompanying the New York Club were Messrs. Silcox and Cooley, K. J. and M. Marx, of Kossuth Marx & Co., Leonard Decker, Messrs. Shelton and Miller, President and Secretary of the Derby Silver Company, Mr. Wooley, of the Elgin National Watch Company, Mr. Johnson, of Colby & Johnson, Mr. Mount, with Randal, Baremore & Billings, Mr. Miller, of H. D. Merritt & Co., Mr. Untermeyer, of Keller & Untermeyer, Mr. Goldie, of J. T. Mauran, J. B. and L. Bowden, of J. B. Bowden & Co., C. Champenois, of Champenois & Co., Harry J. King, C. Booth, of Booth, Babbitt & M. Isenberg, of Harris, Spear & Co., and many others. Among the invited guests were Mr. Mayhew, of Bingham, Walk & Mayhew, of Indianapolis, J. M. Chandler, of Cleveland, M. D. Schroeder, of D. Schroeder & Co., Cincinnati, Messrs. Simons & Young, of Simons

Bros. & Co., Philadelphia, Samuel Walker, of Toronto, Mr. Woodstock, of G. W. Marquardt, Iowa City, D. E. Brown, of Rochester, and several others. Last but not least, was Dr. Branda, who attended as a special guest with a view to professional services in the field, in case any of the boys were seriously wounded on the field of battle.

At 5:30 A. M. the boat arrived at Providence, and the jewelers' party was soon on deck, fresh and enthusiastic, and vociferously claiming the laurels they expected to win. But a brief time elapsed before the Providence Club appeared to the number of 125, under command of President Gardiner. After a few moments spent in friendly greetings, the clubs were formed in column to march to the Narragansett Hotel, where breakfast was awaiting them. The order of march was as follows:

Police skirmishers—Lieut. Dary.
National Band, W. E. White, leader, 22 pieces.
Providence Jewelers' Club, President, Walter Gardiner; Marshal, Thomas W. Manchester; Aids, J. A. Thornton, E. S. Dodge, Jr., C. C. Offerman.

Officers of the Providence Club—Vice President, Walter E. White; Secretary, Walter S. Hough, Jr.; Treasurer, Ralph S. Hamilton, Jr. Executive Committee—John A. McCloy, Wm. H. Luther, Geo. B. Champlin.

Reception Committee in Carriages—Nathaniel Grant, Alfred S. Potter, Fred. I. Marcy.

Carriages containing the Officers of the New York Club—President, C. D. Marsh; Vice President, F. H. Bliss; Secretary, C. W. Cooley; Treasurer, J. G. Fuller.

Carriages containing the invited guests of the New York Club, F. J. Allen, G. K. Lansing, of the Astor House, New York; W. C. Parks, M. Roberts, W. C. Terrill, A. W. Page, D. Schroeder, Cincinnati, Ohio; F. B. Jones, D. L. Safford, James Graham, J. Manning, W. H. Hall, George C. Duffy, Doctor Branda, Walter Bennett, C. D. Liddell, W. Alburger, James Bennet, H. Adams, J. Adams, C. P. Tillinghast, L. T. McCrea, E. DeE. Shelton, W. J. Miller, G. T. Seal, James A. Fisher, D. E. Brown, F. C. Hoagland, L. L. Woolley, Elgin Watch Company.

Farragut Post, No. 75, G. A. R. Band, Peter Richardson, leader, 22 pieces.

New York Jewelers' Club, Marshal, B. W. Allison; Aids, Dyer Brainerd, E. A. Bliss: 140 members.

The Providence Club was distinguished by straw hats, red silk badges and canes, and the New Yorkers by blue and white silk badges. The men marched steadily, and on their arrival at the hotel were escorted into the corridor, where the guests were welcomed by President Gardiner in a neat, felicitous speech, and invited to partake of a substantial and elaborate breakfast. About 350 persons occupied seats at the tables, completely filling the large dining room. Ample justice was done to the bill of fare, which included a rare collection of tempting dishes. A neat menu lay beside each plate, as did also a tempting package of excellent cigars, which were subsequently dissipated in smoke in the corridors of the hotel. Beautiful and fragrant bouquets for the button hole were provided for all present. Just previous to resuming the march for the ball grounds, President Marsh, of the New York Club, presented President Gardiner, of the Providence Club, with two elegant red silk guidons, attached to spear-pointed staffs of rosewood, and bearing the monogram of the club. The speeches of presentation and acceptance were pithy and appropriate to the occasion, and elicited hearty cheers from all present. A tedious march in the hot sun brought the party to the ball ground, where a large crowd was already assembled, among which were many ladies. The game, which was proceeded with at once, was played in the presence of from 800 to 1,000 persons; all the Providence jewelers, with their sisters and their cousins and their a—army of acquaintances having turned out to do honor to the sturdy knights of the ball and bat. The game progressed with alacrity and vim—in fact, there was rather more of both than the New York boys had anticipated. We do not mean to insinuate that

they played badly; they did not, but would have won the game if the Providence boys hadn't played better; so much better that they scored 20 runs while our boys only made 8. But the Providence boys were not to blame; as hosts they did not desire to beat their guests, but they couldn't help it; luck went their way, and they were better players; but the New York boys did well—for them—they made 8 runs while the other fellows were making 20; if the other fellows hadn't made so many possibly the New Yorkers would have made more, or perhaps they wouldn't have made any. Still, they made 8 runs, and this fact must not be overlooked; it was not their fault that the others made 20 runs; they tried to prevent them, but they would do it; probably the air of the Sound, or the sound of the air created by the whizzing balls, did not agree with them; they made 8 runs; we have seen them do worse, but not much. However, it is not our province to report the details of the game—that is more in the line of the Providence papers, for they have something to brag of, and we haven't. But don't forget to remember that the New York Club scored 8 runs while the Providence Club only made 20. We content ourselves with giving the official score that it may be correctly transcribed in history. It was as follows:

PROVIDENCE.

	AB.	R.	IB.	TB.	PO.	A.	E.
Wilkinson, p.....	6	2	4	5	2	18	1
Godfrey, c. f.....	5	3	0	0	0	1	0
Cottrell, c.....	6	4	4	4	13	3	2
Millin, i. b.....	5	3	2	3	5	0	1
Carr, 3 b.....	5	3	1	1	4	1	2
Fiske, 2 b.....	5	3	1	1	3	1	1
Pierce, ss.....	6	1	0	0	0	2	2
McCloy, l. f.....	5	0	0	0	0	0	0
Hall, r. f.....	5	1	0	0	0	0	0
Totals.....	48	20	11	14	27	26	9

NEW YORK.

	AB.	R.	IB.	TB.	PO.	A.	E.
Parks, i. b.....	5	0	0	0	14	2	3
King, r. f.....	3	1	1	1	0	1	1
Maass, 2 b.....	2	0	0	0	0	0	0
Dana, p, s. s.....	4	1	2	2	2	10	2
Fuller, c. f.....	5	0	1	1	0	0	1
Scribner, s. s.....	4	1	1	1	1	4	3
Gaunt, p, c.....	3	2	3	4	7	4	4
Fenn, 2 b., r. f.....	3	1	2	3	2	0	2
Morse, l. f.....	4	0	0	0	2	0	1
Keane, 3 b.....	4	1	1	1	2	0	4
Totals.....	38	8	10	12	27	24	21

Innings.....	1	2	3	4	5	6	7	8	9
Providence.....	2	0	7	2	0	2	0	1	6—20
New York.....	0	2	1	2	1	0	0	1	1—8

Umpire—J. A. Cross. Runs earned—New York, 2. Two-base hits—Wilkinson, Cottrell, Gaunt, Fenn. First base on errors—Providence, 16; New York, 8. Bases on called balls—Providence, 6; New York, 3. Struck out—Providence, 5; New York, 11. Double plays—Wilkinson, Millin, Scribner, Parks, Gaunt. Passed balls—Cottrell, 3; Gaunt, 4; Scribner, 4. Wild pitches—Wilkinson, 2; Dana, 3; Gaunt, 1. Balls called—Wilkinson, 102; Dana and Gaunt, 136. Strikes called—Wilkinson, 13; Dana and Gaunt, 19. Time—3 hours.

We do not pretend to understand the score, but presume it is all right. It will be seen that while the Providence Club only scored 20 runs, the New York Club made a brilliant record of 8 runs. Still, the other fellows were declared winners of the game. There is something mysterious about it; the New York boys went out to gather wool and came back shorn. But it was a nice game and everybody enjoyed it.

The reception committee, consisting of Nathaniel Grant, Alfred S. Potter and Fred I. Marcy, were unceasing in their efforts to make everybody comfortable, and to see that none suffered from the severe drouth that prevailed in that section of Rhode Island. Ice water, Apollinaris water, Congress water, soda water, Chalybeate water and *agua pura* constituted the beverages served by the committee, and

these were dispensed with lavish hands. No one was permitted to suffer from thirst, notwithstanding the altitude of the mercury, but the instant he felt a desire for beverage, he found a member of the committee at his side with a refreshing glass of some one of the above named liquids. The committee had anticipated a hot day and a great demand for cooling drinks, so had scoured the city to obtain a sufficient number of bottles to contain the water mentioned. These bottles were a medley of sizes and shapes, and bore all sorts of inscriptions; soda water was served from bottles labeled "Mumm," while Congress water bottles bore the mysterious legend "Piper Sec;" Chalybeate water was poured from bottles labeled "Cliquot," while the damp moisture known as ice water was served from bottles marked "extra dry." The trouble the committee had getting together such a queer agglomeration of bottles to hold the various kinds of water must have been immense; but it was greatly to their credit that they succeeded and that there was no shortage in any of the numerous kinds of water.

A part of the programme arranged for the entertainment of their guests by the Providence Club was a trip to Oakland Beach, and a regular clam bake on their arrival. The ball game being finished about 1 P. M., the two clubs and their friends marched to a railroad train in waiting, and were soon whirled away to Oakland Beach, where they arrived in good order, and each individual having his appetite with him. After a brief delay, which was improved by story telling and imbibing more innocent water from queer bottles, dinner was announced. Then 400 or more ravenously hungry men sat down to table and made rapid inroads upon the bountiful supply of viands spread before them. Clams are an essential factor at a clam bake, and Rhode Island clams have a reputation of serving on such occasions with especial satisfaction. Clams were not lacking on the occasion referred to—they were present singly and in groups; by the peck, the bushel, the shipload; they were presented in a great variety of forms, and, however they appeared, they were fresh, juicy and delicious. The bill of fare prepared read as follows:

BILL OF FARE:

Fish Chowder.	Clam Chowder.
Baked Clams.	Butter Sauce.
Rhode Island Style.	
Baked Fish.	Baked Lobster.
Sliced Tomatoes.	Clam Cakes.
	Sliced Onions.
Boston Brown Bread.	Radishes.
	Plain White Bread.
	Indian Pudding.
	Watermelon.

Everybody was ferociously hungry when they sat down, but after a little while their appetites seemed to fail them, and the failing appetite was in exact proportion to the clams disposed of. New Yorkers do not often get an opportunity to raid on a Rhode Island clam bake, but when they do, the slaughter of clams is terrible to think of. A statistician present measured the cubic inches occupied by a clam shell, then looked at the pile of shells alleged to have been used in furnishing forth the feast, and from this data he made a calculation that 400,000 clams were eaten on this occasion. This would give 1,000,000 clams and a fraction to each person at table. Hotchkiss, the caterer, declared that this estimate was not exaggerated. However that may be, the guests arose from table with a sensation of fullness under the waistband, each having a consciousness that he had dined right royally on viands fit to grace the tables of the gods.

After dinner, and to assist digestion, various games were indulged in by the merry party, and some practical jokes were played, to the great amusement of all but the victims of them. There was bowling, bathing, riding flying horses, astonishing results accomplished with fire crackers, foot racing, foot ball, etc. More amusement was afforded by the foot ball than almost anything else. Everybody wanted to kick it, and almost everybody got kicked in trying to do so. If a quiet group was gathered together in a shady nook, seeking shelter from the sun, that foot ball, with a long tail of string following it,

propelled by the foot of some vigorous kicker, was sure to descend suddenly in the midst of the group, scattering hats, cigars and eyeglasses promiscuously, and generally laying at least one of the party on his back. Our friend Cooley was walking in a meditative mood across the grounds, when that foot ball suddenly appeared upon his flank, assailed him in the rear, and sent him flying into the air like a comet. He alighted in an adjacent tree, where he sat for an hour and a half waiting for his cane, that went up at the same time he did, to come down. He didn't mind the injury to his outworks, but he didn't want to lose his cane. A knot of a half dozen were in a summer house, cooling themselves with Apollinaris water, when that foot ball came bouncing in the window, caromed on the water bottle, knocked four goblets off the table, massed on the nose of one, kissed the next man in the left ear, and pocketed all hands in one corner. The musical Booth was caught in the stomach by that foot ball while making one of its wildest and most erratic flights. He was doubled up like a jack knife, and only had wind enough left to ejaculate "do, me, so!" but some of the bystanders remarked that he said it with so much uncution that it really sounded like profanity. Johnson, the ubiquitous, received the said ball on the top of his hatless head, and when he got up excitedly inquired if the comet had struck anyone else. Sillocks witnessed the antics of the foot ball, and not relishing an intimate acquaintance with it, took a position with his back against the trunk of a tree, where he remained as long as there was danger. In short, the amusement afforded by the foot ball was hugely enjoyed by all, and its peculiar antics served to keep things lively.

When the crowd first arrived at Oakland Beach, the reception committee made headquarters in a building that had once been a picture gallery, and announced that they were ready to take photographs in any style. Nearly everyone availed himself of the opportunity, but it was noticeable that they all assumed nearly the same position—body upright, right arm raised to a level with the eyes, elbow bent and head slightly thrown back. It was apparent, however, that the artists gave satisfaction, for all who had their pictures taken spoke in the highest terms of them and invariably came away with a smile on their countenances.

Just before the dinner was served, Mr. J. G. Fuller, of the New York Club, presented to Charles W. Gaunt, Jr., of the New York Club, a prize badge, which the club had voted to award the member of their base ball nine who made the greatest number of hits in the Providence game. The speeches of presentation and acceptance were brief, and the recipient was honored with three rousing cheers. The badge is a neat one, is valued at \$20, and was manufactured by G. W. Malliet, of John street. The bar is a gold ball bat, suspended from which by two little gold chains is a flat ring, upon which in blue enamel is the inscription, "Champion, N. Y. J. B. C." Within the ring is suspended a platinum ball. The badge is thrown out in bold relief by a blue ribbon.

Just previous to leaving the grove, Mr. T. W. Manchester, the marshal of the day, in behalf of the Providence Club, presented to President Marsh, for the New York Club, the foot ball which had done such good service in preventing indigestion by overloaded stomachs. Finally, the commissary stores having been put aboard the train by the reception committee, the crowd soon followed, and were speedily whirled back to Providence. Again the column was formed and marched to the boat, the procession being greeted by hearty cheers on all sides as they passed through the streets. The Providence Club took leave of their guests at the boat, amid the hearty exchange of good wishes and fraternal feeling.

Our representative, Senior, as we are informed, who accompanied the New York Club, abandoned the club, after they had made 8 runs to the other fellows 20, and thereafter hob-nobbed with the Providence Club. Therein he showed the instinct of a true journalist, who are always to be found on the winning side.

Jewelers' Day has now become an annual event to be looked forward to with pleasurable anticipations by the entire trade. This year, the jewelers of Providence contributed liberally to make the

event memorable for its sociability and good fellowship. While the entertainment provided was enjoyable in every particular, there were no excesses of any kind to mar the festivities. All present appreciated that they were out for a holiday, and intended to get all the fun out of it possible, but to do so like gentlemen, and not one overstepped the bounds of propriety. It is a good thing for business men to mix thus socially with each other, and seek to cultivate the human rather than the business side of their fellows. We have too few holidays and too little relaxation at best, and it does us all good to lift our noses from the grindstone occasionally and take a sniff of social intercourse. We hope to see Jewelers Day observed faithfully every year, and more of the older heads participate in its festivities.

Our Paris Correspondence.

CHANCING to find a copy of THE CIRCULAR in the office of M. Samper, Rue de la Paix, I at once became conscience-stricken by the remembrance that I had promised to drop you a letter occasionally while abroad. I ought to have done so; I meant to have done so; but I haven't yet. The fact is, I have been so busy during the past few weeks, running from one city to another, looking for goods, calling upon manufacturers and hunting for novelties, that I am pretty well used up. It is a fearful job to come over here to buy goods; the first time there is a novelty about it, of course, that lends a charm to it, but to come over year after year, going over the same route each time, rushing and bustling about in the greatest hurry so as to get home in time to let the boys take their summer vacations, is no joke, I can tell you. Then, in an unguarded moment I promised to write for THE CIRCULAR. While dining with the confidential manager of M. Samper, the other day, he related some interesting stories relative to the means employed by sharpers to rob the trade here. As some of these have been printed he gave me the newspaper slips which I send as being better than any original letter I could write. The stories constituted a letter to a London paper. Here they are:

"Everybody knows Samper, whose big shop window, brilliant with gold and gems, attracts the attention of all strollers on the Rue de la Paix, and Samper knows everybody who is worth knowing, as he has furnished half the millionaires of Europe with their jewelry. It was a risky thing, then, for the stranger who tried to get the best of the clever lapidary. Nevertheless, there is no limit to brass, and said stranger, a young man of gentlemanly manners and appearance, alighted from a private carriage, with a coachman and a flunky in faultless livery, entered the establishment, and, declining to speak with any one except the great Panjandrum himself, stated his wish to buy a sapphire worth 32,000f. Samper had no such stone on hand, but thought he might be able to find one in the course of a few days would Monsieur come back? Monsieur said he would, and explained that he wanted it for a seal ring. "Is it not rather too good for such a purpose?" suggested the jeweler, who forthwith retired, crushed with mortification, when the other replied, "Nothing is too good for me." Samper was overwhelmed, and even opened the door himself for his customer, who returned in the same equipage four days afterward saw the sapphire, condescended to be satisfied with it, and requested to be shown the handsomest ear-rings and lockets in diamonds which were in the collection. His choice was made promptly to the tune of 75,000f., after which he took out a check-book and signed an order on the Crédit Lyonnais for the money in the name of Prince Strozzi. "What name?" asked Samper. "Prince Strozzi." "Hie!" exclaimed the lapidary, and then the door was locked and the police sent for and in five minutes the stranger, ornamented with a pair of bracelets not set with brilliants, was on his way to the station, accompanied by an admiring crowd, and to the utter dismay of his coachman and of "Tummas," who remarked, sadly: "Good God! they have collared master; in whom, hereafter, can we put our trust?" The culprit is an old offender, and if he has now failed it was because he had tried it on in the same way last year with another notable jeweler—M.

Boucheron, who lives close by, to whom he gave check for 190,000f after a similar comedy. Boucheron suspected the fraud, but, wishing to take the swindler, said nothing, promised to carry the jewelry to the Grand Hotel—he pretended that it needed polishing—and sent to the Crédit Lyonnais, where he found that "Prince Strozzi's account, originally of 1,500f., was actually 50 cents. Naturally, the Chevalier d'Industrie did not return to ask questions concerning the non-delivery of his purchase, but a twelvemonth afterward, supposing the adventure forgotten, went for another victim in the same neighborhood, and was then rehandred. Denial being useless, he has made a clean breast of it, and told that his real name is Tamin, that he lives in a wretched lodging-house in the Latin Quarter, and gains a precarious existence by nefarious expedients, these being baccarat at the Cercles in the evening, and theft by daylight. This capture is important, as it may lead to that of others of the swell mob with which Paris is infested, and whose exploits are not always failures, as in this instance. Less lucky than his colleagues of the Rue de la Paix, another M. Boucheron, residing in the Palais Royal was plundered of a diamond brooch worth 50 000f, exactly four and twenty hours before Tamin-Strozzi was arrested, under circumstances of singular audacity and it is not unlikely by the same individual.

People who visited the Exposition of 1878 remember the magnificent diamond set which was the grand prize of the National Lottery On Friday, at 3 P.M., a number of persons came into the shop to look at some jewelry; the prize set was brought out, but, the price not suiting, was put on one side while the customers inspected something less expensive.

Just then a young man, dressed as an Englishman and with a strong foreign accent, entered and asked for some diamond studs, taking his seat close to the counter where the big set was deposited. I ought to add that this consists of a diadem, a necklace, a brooch—the most important pieces—and a pair of ear-rings. The studs were too dear and too large, and the clerk was told to fetch out something cheaper and more modest. The clerk went to the back shop to get some, first, however, taking the precaution to call in his fellow-employee, M. Leon, who was bidden to keep an eye on the visitor, who had dropped his umbrella three times in the most suspicious manner. M. Leon was vigilant. The stranger rose, walked about the shop very unconcernedly, gave his name as Lord Trelawney approached the door, opened it, stepped outside, and has not been seen nor yet heard of since, any more than has the diamond breast-pin, which was prised during the moment elapsing between the exit of one shopman and the ingress of the other. Evidently there is some connection between these two affairs, and the detectives are sanguine of being as successful as they were in the recovery of the necklace stolen a year ago by the Bulgarian Kalish, whose accomplice was arrested a few months ago, on her return back from New York, where she had vainly endeavored to dispose of the property. There is a vast deal of this sort of thing going on now in Paris, and too much reason to suppose that people occupying perfectly unequivocal positions in society not infrequently consent to serve as receivers, and to aid in sales. To get something below its market value is a wonderful inducement to some persons, especially to foreigners, who, being generally on the wing, are less likely than natives to be met by the original owners.

I would not for one moment cast a doubt upon the genuineness of origin of a certain immense emerald which its proprietor is trying to sell to the wife of an American millionaire for 70,000f. It is said to have been presented to an ancestor by a great Sultan two or three centuries ago; perhaps it was, and, as the gentleman who now offers it bears an unblemished reputation, I should think the story true.

But I cannot forget one incident in which a very high-born lady was very nearly ruined by a very simple act of complaisance towards one of her friends, who was in money difficulties. The tale is perfectly authentic. It was told to me last night by one of the parties involved

and for that reason I shall only give initials, which, I need scarcely add, are not the real ones. Said the Countess de L. to the Marchioness de M: "I am requested to sell a lot of diamonds for the Queen of—; do you know any one in want of a splendid set; nice a bargain?" The Marchioness did; M. de N. was about to get married; it would be the very thing for a wedding present, and she would speak to him. So she did, and he took her advice, and, quite by chance, happened to meet an acquaintance, a celebrated lapidary from London, who consented to accompany her as an expert. The stones were produced and weighed and examined, and approved of by M. de N., who, however, did not conclude their purchase at once, thanks to a sign from the Englishman. "I cannot understand your disapproval," he said, when they got into the street; "the diamonds are magnificent, they are dirt cheap, why should I not buy them?" "Simply," replied Mr. D., because they belong to me; a fortnight ago they were stolen from my rooms, and it is for their recovery I am in Paris now." No scandal was made about the affair, as the Countess is too well connected, and Mr. O. declined to ruin her family by a prosecution, being perfectly satisfied to get back his property, but, as the coachman of Tamin-Strozzi might have observed, is not this a warning against over-confidence?"

So you see all the rogues are not in New York, nor are the Americans the only ones imposed upon by sharpers pretending to be titled persons. By the way, Europeans po'e fun at us whenever we get taken in by an imposter, and call us "toadies" and other disagreeable names, but it takes your native born European to be a toady. Why the merchants and business men of London and Paris would lick the dust from the shoes of the veriest nincompoop that walks provided he wore a title. Their obsequiousness and menial subservience to rank makes my blood boil. There is not a darkey waiter in New York would play the flunkey to the best or wealthiest man in the country as I have seen the heads of respectable houses here flunkey to My Lord Nobrains. The worst is, these titled people always buy on credit, and there are plenty of them that take it as an insult if asked to pay. Regards to all the boys. L.

PARIS, July 19, 1881.

The Night Light Signal.

A NOISELESS CLOCK, which also acts as a cheap night light is described in the *English Mechanic*. The reservoir or receptacle for containing the oil is formed of any desired material, and can be cylindrical or any other suitable shape provided that its internal capacity is the same throughout its entire depth. At the upper part of the said reservoir is fixed in a vertical position or nearly so a dial or clock face, through the centre of which passes in such a manner as to be capable of turning freely, a spindle, one end of which is fixed a hand for indicating the time, and on the opposite end is mounted a small pinion. A float is placed within the oil reservoir and to the top thereof is attached a rod fixed vertically, the upper end having a rack thereon which gears into the before-mentioned pinion. The wick holder is arranged in any suitable manner at the upper end of reservoir, and when the clock face is transparent it is placed behind the same, thus effecting the double purpose of illuminating the said clock face and also of modifying the light: the wick passes through an aperture or space in or at the side of the float or in any other suitable manner to the oil. The action of the apparatus above described is as follows: It having been ascertained that a certain quantity of oil will be consumed in a certain time, and that consequently the float will descend a certain distance with the alteration in the level of the oil, the rack and pinion are so formed that on the rod descending with the float, the pinion will be caused to revolve, and with it the hand, which will indicate on the clock face a period of time corresponding to that occupied in the consumption of the quantity of oil referred to. When the lamp is lighted the hand may be moved to the exact time by putting the rack out of gear with the pinion and turning the hand round.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Eighty-sixth Discussion.—Communicated by the Secretary.

[NOTICE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. Write only on one side of the paper, state the points briefly, mail as early as possible, as it must be received here not later than the eighth day of the month in order to be discussed and reported in the CIRCULAR for the next month.

HEAVY SPRINGS IN WATCH CASES.

Secretary of Horological Club:

Allow me to call your attention to an abuse which is now prevalent in the watch trade. I refer to the practice of putting such enormous springs in watch cases, especially in silver cases. The fact that these springs are weighed with the case and paid for as so much precious metal, is the least objectionable feature about it. What is still worse, is that nine-tenths of these springs are more or less magnetized. As anyone acquainted with electricity knows, the heavier the springs are, the stronger their disturbing attraction upon the movement. Now just imagine a movement surrounded with several ounces of solid steel, acting as a pair of magnets, to attract the arms of the balance, the lever, and other steel parts, and interfering with their proper motion and action. It is impossible for a watch to keep good time under such circumstances, and the higher the grade of the movement is, the more injurious and noticeable is the effect of this disturbing cause. I have found numerous instances where good watches have become almost worthless for time, and watchmakers have been blamed for ruining them in cleaning or repairing—when the real trouble was that the enormous case springs had become magnetized, and were constantly drawing the steel parts to one side.

Nor does the mischief end here, for these heavy spring magnets gradually magnetize the steel parts of the watch, and it is then ruined, even if the springs are removed and changed. Not one workman in a thousand knows what to do with a magnetized watch, even if he could discover whether it was magnetized or not.

In a common cheap watch this does not matter so much, for the owner cannot expect any extra close time-keeping, but it is different with a fine movement. The owner knows that it is certainly ought to do better than it does, and very naturally concludes that the enormous prices of fine movements are put on just for "the name of it," without any additional value, and are really a swindle on the buyers. I believe that magnetized case springs have had more to do with discrediting fine watches than any other one thing, and the retail trade must be able to see that it is for their interest to put a stop to this evil, by refusing to buy cases containing half their weight in steel and brass. It is worse than an imposition upon them, for they are obliged to sell the cases in the same way as they were bought, and are thus compelled in turn to defraud their customers, the wearers of watches. It is a fraud upon all parties concerned, except the jobbers, who alone profit by it, by being able to make a lower price than their more honorable competitors, on a case of the same nominal weight and quality. Please ventilate this matter in the Club, for the good of the trade.

Mr. Clerkenwell said it really was inexcusable to sell steel and brass as fine silver and gold. The quoted weight of a case should be the weight of the precious metal of which it was composed—excluding all extraneous parts, except perhaps the joint pins. The springs, etc., should be covered by the charge for making and springing the case.

As regards the size of the springs, they were unquestionably in many cases altogether larger than there was any excuse for, and they were so enlarged in order to swell the profits of the case manufacturer. Reducing the size of the springs would not remove the trouble about magnetized watches, however, but it would of course lessen the bad effects on the movement. The only sure way to prevent trouble from that source is to test every case spring, (as well as the steel parts of the movement,) whenever the watch is cleaned or repaired, and at once reject or correct every piece found magnetized. It will not do to leave a spring in because it is magnetized but a little, for it has been found that when a magnet is so placed as to constantly exert its magnetic attraction upon some magnetic metal or body, its

magnetism gradually becomes stronger, and it would ultimately magnetize all the steel parts of the movement, as Mr. Retailer had stated.

Dealers have it in their own power to check the practice of using such enormous springs. There are makers whose cases are unobjectionable in this respect, and if dealers should refuse to buy cases with extra heavy springs, or to pay the price of gold and silver for steel, the evil complained of would come to a sudden end. Case springs should always be large enough to be substantial and firm, however, and the better way would probably be to designate the weight of the cases exclusive of the springs. That would be a straightforward way of doing business, and fair for all parties. There would then be no inducement for case makers to use springs any heavier than needful for good performance.

ENGLISH WATCHMAKER'S OPINION OF PRACTICAL HINTS ON WATCH REPAIRING.

Secretary of Horological Club:

Having read in the JEWELERS' CIRCULAR some of the articles under the heading of "Practical Hints on Watch Repairing," I was highly gratified. I consider that they give some capital advice in that branch of business, and I may say, a more practical and reliable guide I have not found. I suppose it is published in book form. If so, and if at a reasonable cost, I should be glad to procure one, as it will be a great boon and help to any watchmaker. I should feel greatly obliged if you would kindly acquaint the publisher with the matter, or else to forward me the directions where it is to be had direct, and the cost of it. Enclosed find envelope for reply. I failed to get one of Mr. Bush, at Hull.

Yours truly,
F. S.

The Secretary, after reading the foregoing letter, stated that the information had already been sent to Mr. S; and he would also say, for the benefit of any other foreign readers who might desire the same, that Excelsior's book is published by D. H. Hopkinson, Esq., the proprietor of the JEWELERS' CIRCULAR, and will be sent for \$3.50, postpaid to any country included in the International Postal Union. This book contains the first series of "Practical Hints on Watch Repairing." The second series has just been completed and is not yet republished, but can only be had by getting the back numbers of the CIRCULAR containing them. It is expected, however, that they will shortly be issued in book form, and a large number of orders have already been sent in for them, in advance of publication. We sometimes receive three or four letters in a single day, informing us that they want copies, or making inquiries. In fact, a larger part of the Club's correspondence is about Excelsior or his writings than on all other subjects. To all such we can only reply that we cannot say anything about the matter, one way or the other, as it all rests with Excelsior himself, and his health is such that he is not at present able to do anything about it. When the matter is decided we will give our correspondents due notice.

To Messrs. G. W. L., and numerous other inquirers, we must therefore reply to their query, "when can we obtain Excelsior's works complete?" that the foregoing remarks give all the information that we can now offer. As to the work itself, we can cordially recommend it, and say that it will be the most complete and reliable guide, and the most valuable to the practical workman of anything yet published—and this is the universal verdict of every good workman who has read the articles as they appeared in the CIRCULAR. F. D. S. writes:—

BACK NUMBERS OF THE CIRCULAR WANTED.

Secretary of Horological Club:

Will you please inform me when the second series of articles on "Watch repairing," by Excelsior, commenced in the CIRCULAR? I have the first series, and I want the second; and if they are not intended to be published in book form, I wish to advertise for the back numbers of the CIRCULAR that have them in.

What would it cost me to advertise in the CIRCULAR, or do you know of any that I can get? I have the numbers of this year. If you would be so kind as to answer this, you will oblige me very much.

F. D. S.

The Secretary referred to the CIRCULARS in the Club library, and

and that the second series commenced in the number of July, 1876. He did not know of any set of back numbers that could be got. We had several times invited anyone who had them and would sell them to communicate with the Club, but have never received a single offer. He feared Mr. S. stood but a small chance, but presumed the editor of the *Circular* would insert the advertisement for him at a very low rate. He had recently been informed at the *Circular* office that there were a few bound copies of the two last volumes of the *Circular* left, at \$3.50 per volume, and a few scattering numbers previous to those dates. But even they might have been sold by this time, so great was the demand for anything containing Excelsior's articles. He believed that the preceding remarks would answer all inquiries up to date.

COLORING GOLD—CLEANING WATCHES.

Secretary of Horological Club:

Would you be so kind, through the *Circular*, to give me a good recipe to restore the color to solid gold articles after being mended with hard solder, that does not take much work and time to use? I have not any that gives me satisfaction. Also, would like to know the best article for cleaning watches. Yours, etc., C. M. B.

Mr. Rollier said that Mr. B. probably boiled out in dilute sulphuric acid, and that was the common practice, and usually successful, unless the acid was too old and weak, or the heat was insufficient. If Mr. B. wanted a process for actually coloring gold, he would find several good recipes in the Club proceedings a couple of months ago, also in the articles on alloying and coloring gold, which are now being published in the *Circular*.

The article preferred for cleaning watches is 98 per cent. alcohol, except for parts which are cemented together, like pallet jewels, the ruby pin, etc. All such pieces should be cleaned with pure benzine, prepared specially for the use of watchmakers. The mode of using these articles has been so often stated that it is needless to repeat, as Mr. B. can readily find all details by looking over our Proceedings for a few months past.

HARD-SOLDERING WITHOUT A BLOWPIPE.

Secretary of Horological Club:

Please submit the following to the Club: Is there any method of hard soldering without the use of a blowpipe, known to the members of the Club: any simple method? The reason I have for asking is, that a brother watchmaker pretends to know some method, but keeps it a great secret, and I am of the impression that I can get at what I want through your Club if it can be got at in any way.

IRREPRESSIBLE.

Mr. Blowpipe replied that a blowpipe is not necessary in hard-soldering, except to direct the flame. For coarse work it may be dispensed with. In shops where gas is used it is common to use a gas jet for soldering, and by regulating the size and shape of the flame, a great many jobs may be done with the gas jet alone. Many kinds of blowing apparatus are used, but they are really a sort of mechanical blowpipe, although not blown by the mouth. For fine work, however, there is no practical substitute for the blowpipe, because it permits of such perfect control of the size and character of the flame, and of directing the point of greatest heat to the exact spot where it is needed to cause the solder to flow, or lead it to "run" in the right place and nowhere else.

STANDARD TIME—GRADES OF SOLDERS—BACK NUMBERS OF THE CIRCULAR.

Secretary of Horological Club:

I am more and more interested in articles in the *Circular*. The one on the question of uniform standard of time in the *Science*, is a good idea, and would do much toward making the different standards which are now used a unit. One person may have Kansas City time, another Jefferson City or railroad time, another Denver time, and so there is no uniformity at all; but if we had only five standards, each fifteen degrees apart, there would be an advantage gained. If the railroads can be induced to take hold it will go, but if not there may be some difficulty in adopting it. Under the head of "Soldiers and Alloys," are given recipes for making, but I would like to ask if

any jobber keeps the different grades, as soft, middle, and hard solders, and have them marked or designated in some way, which is which; if so, please let me know. I wish to thank Mr. Rollier for his explanation in the matter of making the solution to dissolve solder. I bought the sulphate of iron and common commercial salt-petre, which I notice is not pure enough. I would say too that I am a happy possessor of the Practical Treatise of Excelsior. Can I procure the back numbers of the *Circular*? How far back, and cost? E. Y. D.

Mr. Regulator considered the proposed time standards as the best system yet offered. There were some difficulties about it, however, which would be a little annoying at first. For instance, if one of the standards was at Chicago, then a man would have to set his watch an hour forward or back, according as he was going east or west from that city. And as trains bound in both directions run southward in leaving the city, and for quite a distance outside of it, we should have the singular spectacle of trains running on nearly parallel tracks, and within speaking distance of each other, with an hour's difference in the conductors' watches! At some of the crossings of different roads, great care would be required under such circumstances to avoid mistakes and accidents. But doubtless all this would be overcome as soon as railroad men got accustomed to the system. As Mr. D. says, it all depends on the railway companies taking hold of it, for the main benefit of the entire plan is for the traveling community.

He thought Mr. D. would not be able to find solders of all grades, and each marked, as described, but would probably have to make for himself such qualities as he wanted. Dealers only keep a few of the solders most used.

The inquiry about back numbers of the *Circular* had already been answered by the Secretary, in reply to F. D. S.

DETECTING WATCHES THAT HAVE BEEN TAKEN APART.

Secretary of Horological Club:

I am told by one jeweler that the works of a watch are submitted to a process after putting up at the manufactory, which renders it impossible to take the work down and put it together again, without leaving certain marks that may always be detected by the aid of the glass; and I am also told by another that any good workman can take down and put up the works of any number of watches, without leaving any marks by which they may be distinguished from a similar number of works which have never been taken apart. Now which is right? Will you please answer through the *Circular* and oblige, W. A.

Mr. McFuzee presumed that there was some misunderstanding of what the first jeweler had said about the matter. In taking down a watch, the workmen is liable to bruise the screw heads, rub the blue off, scratch the gilding, or soil the clean surface with the fingers—and any such marks could be detected with a glass, even when imperceptible to most eyes. But at the same time a fine workman can, with care, take down and put up a movement without leaving the slightest perceptible marks or traces of his work. There is no "process" to which new movements are subjected for any such purpose—they are merely put up perfectly clean and free from bruises, scratches, etc., so that any such damage will prove that the watch has been handled. That is all.

The nearest to such a "process" that he ever knew about, was a practice which he himself once followed. He was working in a place where competition was sharp, and he warranted his work thoroughly, but made it understood that his warrantee ended the moment that any other workman made the slightest alteration, or was allowed to handle it at all. In order to know whether a watch had been tampered with, he always placed the holding screw, and other parts, in exactly such a position, so that if he found those screws or parts in any other position, he knew at once that someone had had the movement out of the case, or been looking at it. He also had one invariable way of fitting on the hands, fastening the dial pins, etc., which was both sure to "stay put," and enabled him to detect any change that had been made. But no such practice is followed with new movements, and the second jeweler is correct.

Standard of Gold and Silver Manufacturers in Switzerland.

REPORT BY MR. FISH, CHARGE D'AFFAIRES AT BERNE, TO THE SECRETARY OF STATE.

I have the honor to inclose herewith two French and two German copies of the Swiss law of control and guarantee of standard in gold and silver manufactured articles, of December 23, 1880. This law, which is to go into effect January 1, 1881, will serve to remedy one of the greatest evils to which the Swiss watch industry has hitherto been subject, by furnishing a guarantee of the quality of the goods to the purchaser and to the workmen, who in many cases receive a large portion of their earnings from the parings. The law is most liberal in its provisions, and is intended solely as a protection against abuse, and is in no sense an enactment for increasing the revenue.

NICHOLAS FISH, *Chargé d'Affaires*.

LEGATION OF THE UNITED STATES,

Berne, Switzerland, Feb. 17, 1881.

SWISS LAW CONCERNING THE CONTROL AND GUARANTEE OF STANDARD IN GOLD AND SILVER ARTICLES.

The Federal Assembly of the Swiss Confederation, in applying articles 31, letter C, and 64 of the federal constitution, in consideration of the message of the Federal Council of November 28, 1879, decrees:

ARTICLE 1. The manufacturing and sale of gold and silver articles of all standards are subject to the following provisions:

A. For watch cases bearing, in whatever language or cipher, in full or in abbreviation, one of the following indications, or one corresponding thereto, namely: For gold, 18 karats or 750 thousandths and upwards; 14 karats or 583 thousandths; for silver, 875 thousandths and upwards, 800 thousandths; the mint mark is obligatory; they must be stamped with the federal stamp of control, according to the provisions of the federal regulation for the execution of this law, unless they bear the official mint mark of another country, recognized as equivalent thereto.

B. For other articles of gold and silver (goldsmith's work and jewelry) the mint mark is optional. Such of these latter articles as are of a superior standard, namely, gold, 18 karats or 750 thousandths and upwards; silver, 875 thousandths and upwards, may be officially stamped, even when they do not bear an indication of their standard.

ART. 2. Watch cases and other gold and silver articles not officially controlled shall not bear any other indication of their composition or alloy than that of their actual standard. If they bear the latter indication they must bear also the mark or sign of their maker, in conformity with the provisions of the regulation of execution.

A tolerance of 3 thousandths is allowed in the assay for gold, and of 5 thousandths for silver, irrespective of the standard.

No portion of the articles of gold or silver can be of a lower standard than that which is stamped or indicated. The regulations for the execution of this law will set forth the detailed provisions, and will fix the requisite exceptions.

It is forbidden to engrave on works of another metal, or on plated articles, indications tending to deceive the purchaser.

ART. 3. The creation of bureaux of control belongs to the cantons, subject to the following provisions concerning their organization:

The sworn assayers must have a federal diploma. They are subject, as regards the technical portion of their work, to the direction and supervision of the federal authority.

The bureaux shall be furnished with a sufficient number of assayers and other employees, besides the apparatus and material necessary for the assays, according to the federal provisions. They are obliged to assay and stamp, in the order of their reception, the articles which are sent to them, from whatever part of Switzerland they may come, and to return them without charge for packing. The Federal regulation may prescribe the measures to be taken to prevent the bureaux from being overcrowded with articles.

The taxes to be collected for the assays and the stamping are to be fixed by the federal regulation. They shall not be of a fiscal character.

The receipts shall belong to the cantons or communes who have to provide for the maintenance and support of the bureaux.

The bureaux of control are responsible for their assay and stamping; they are responsible for the articles which are confided to them in conjunction with the communes and cantons to which they are subordinate.

ART. 4. There shall be established at the Swiss polytechnic school a federal bureau of control, specially destined for training assayers possessing the requisite knowledge, and to revise, in case of contention, the assays of the other bureaux. The receipts and expenses of this bureau shall be included in the budget of the federal department of commerce.

ART. 5. The federal department of commerce and agriculture shall exercise the supervision reserved by article 3 to the federal authority. It shall furnish to the bureaux of control the federal mint-stamps upon payment of the costs.

ART. 6. Whoever shall have made, sold, or exposed for sale, watch cases bearing the indication of the legal standards without the official mint-mark, shall pay five times the amount of the tax for the official stamping, if the official assay shows that the indication is not fraudulent. In that case the official mint-mark shall be stamped without further charge.

Whoever shall have made, sold, or exposed for sale watch cases of other than the legal standards, or other work of gold or of silver not officially controlled, with the indications of their standard, but without the mark or sign of their maker, shall pay a fine representing four times the amount of the tax for stamping of the legal standard mint-mark, if the official assay shows that the intent was not fraudulent.

In the two cases above mentioned the total of the fine cannot, however, exceed 500 francs.

Those who, with fraudulent intent, shall have made, sold, or exposed for sale articles, in contravention of the present law, shall be punished by a fine of from 30 francs to 2,000 francs, or by an imprisonment of from three days to one year, or by both penalties combined, within the limits set forth.

The following shall be deemed fraudulent:

a. In what relates to manufactured articles of gold or silver whatsoever.

1st. Every indication as to their composition or alloy except that of their actual standard, whether made upon the articles themselves, or at the time of their sale or of exposing them for sale.

2d. The presence in a manufactured article of portions thereof of an inferior standard to the standard stamped thereon or indicated, subject to the reservations of the provisions and exceptions foreseen by the regulation (article 2, paragraph 3 of the law).

b. In what relates to manufactured articles of other metals or to plated articles, every indication tending to deceive the purchaser whether made upon the articles themselves, or at the time of their sale or of exposing them for sale.

ART. 7. Whoever shall have counterfeited, in whole or in part, the official marks, or shall have knowingly applied counterfeit marks, or who shall have changed or caused to be changed, with a fraudulent intent, the official marks, shall be condemned to an imprisonment of from one month to one year, and to a fine of from 100 to 1,000 francs.

Every person knowingly making an illicit use of the official mint-marks shall be condemned to an imprisonment of from 14 days to one year and to a fine of from 50 to 1,000 francs. If it is an employee of the control he shall in addition thereto be dismissed and deprived of the federal diploma.

Every person belonging to the administration of control or an employee thereof who shall copy, or permit to be copied, the works deposited with the control, shall be punished by a fine of from 20 to 200 francs. If there has been deception or gross negligence, he shall, in addition thereto, be dismissed and deprived of the federal diploma, if he holds one.

ART. 8. The federal council may, at any time, forbid the use of marks or signs which might give rise to confusion with the official mint-marks.

ART. 9. In case of a repetition of the offense these penalties may be increased to the double of those pronounced in regard to the preceding offense.

The amount of the fines and confiscations shall be deposited in the fund designated by the canton.

On imposing a fine the judge shall assign an imprisonment in proportion to the fine in case the latter shall not be paid.

The civil indemnity for the cases provided for in articles 6 and 7 remains.

ART. 10. Prosecutions will be begun at the request of the local cantonal or federal authority of supervision, or that of the party injured.

The courts shall prescribe, in conformity with the laws of procedure, the necessary investigations and measures of protection. They may decree the confiscation of the articles seized to the amount of the damages to be paid to the injured party and of the fines due. They may also decree the insertion in the public press, at the cost of the party convicted, of the judgment pronounced.

In all cases the counterfeit mint-marks shall be confiscated and destroyed, and the articles bearing fraudulent inscriptions shall be put up.

ARTICLE 11. This present law shall go into effect January 1, 1882. It supersedes, from that date, the provisions of the same nature of the cantonal laws and ordinances.

In the four months which precede that date, all works which, without bearing inscriptions of a nature to deceive, do not fulfill the requirements of the present law, and those of the regulations for its execution may be stamped with a mint-mark *ad hoc* or a lead stamp, by the bureaus of control.

From the time the present law goes into effect, every article not marked with leaded or stamped with such mint-mark *ad hoc* shall be dealt with in accordance with the provisions of articles 1 and 2, and 6 to 10; but, however, the articles which, at the time of the promulgation of the law may be abroad, shall be admitted to receive the mint-mark *ad hoc* or the lead stamp, upon proof that the holder of such merchandise was prevented with complying with the law at the proper time. This exceptional faculty shall terminate after a period of five years after the going into effect of the law.

ARTICLE 12. The federal council is charged with the publication of the present law in accordance with the provisions of the federal law of June 17, 1874, concerning the popular vote upon the federal laws and decrees.

Thus decreed by the National Council, Berne, December 23, 1880.

Odd Taste in Jewelry.

"HERE is something new in the way of ornamentation," a salesman in a large up-town jewelry store said, opening a box and exhibiting a monster beetle, four inches in length. About its body was a solid gold band, locked by a tiny gold padlock, to which was attached a costly gold chain, about two inches in length, fastened to a pin. The beetle's back glistened in the light, having been treated to a dress of gold, and as it lumbered along its legs worked in a curious fashion. "It's a shawl pin. You see the pin is used to fasten lace or a shawl, or perhaps worn on the bonnet, the insect crawling around the length of the chain. They are perfectly harmless and not expensive, as they live on air—that is, they have never been seen to eat. This one was brought here to mount, which is a very fine operation, as the legs and antennae are all so delicate. After all, there is nothing objectionable about them, except the idea of having them crawl over you. They all come from South America, and the only lot now in the city is to be taken to France, where the owner will try to introduce the fashion of wearing them. They cost from ten to fifty dollars, depending entirely upon the mounting of the ring. There is nothing cruel about it; as they are bound loosely, and the gold has no effect upon their hard sides."

In Brazil the fashion of wearing beetles is carried to a great ex-

tent. A well known resident has a beetle with a collar of gold which meets at the top, and is there ornamented with a diamond of great value. The insect has a cage, surrounded by the plants among which it lives in its native state, and nothing is neglected to make it as comfortable as possible. But the most popular insect used for an ornament in Brazil is a small phosphorescent beetle. These are often worn fastened in the hair, and as the two phosphorescent or light-giving spots are on the sides of the head, the black insect is, of course, invisible, especially when in the raven locks of the fair Brazilians. Twenty or thirty of these beetles will throw out a light sufficient to read by, and when arranged around the head in a circle, or grouped over the forehead and held in place, the effect is beautiful.

Several years ago a New York lady gave a masquerade ball at her summer house in Newport. The dancing was on the lawn, and the guests were requested to be there half an hour before dark. The hostess wore the costume of night, and in the daylight her black dress, covered with ivy leaves, did not attract special attention, but when she appeared in the gay throng after dark she presented a perfect blaze of light, and was the center of the admiring and wondering company. Tremulous waves of reddish-yellow flame seemed to move over her entire dress while in a cap on her head gleamed one great fiery star. The cause of this illumination was the phosphorescent light of more than five thousand fire flies. For weeks previous to the ball the designer of the costume had been storing away fire flies, and on the day of the fete they were rapidly put on the dress. As the light-giving spot is on the ventral surface, each one was placed on its back and held down by a fine silver wire, so skillfully caught that it could not turn over or escape, and was not injured. The star was formed of many beetles.

In Jamaica a large beetle, the *Lampyrus*, is used by ladies. Some of the phosphorescent beetles used by them give out lights that have to be seen to be appreciated, and more than twenty different kinds are used, representing as many different degrees of light, shade, tint, etc. One, the *Pygolampis*, has a rich orange color, changing to yellow, flickering in intermittent flashes of light; another, called *Photuris*, is curious for the gradual increase of light it shows; commencing with a faint reddish hue, it rapidly grows in brilliancy, finally blazing like a torch, a rich green light, and then dying away to repeat again. They attract other light-giving beetles, and frequently numbers of lesser lights are seen fitting around them, combining red and yellow lights of the greatest brilliancy. Other uses are made of these beautiful creatures than as ornaments. Travelers have fastened them to their feet and carried them in baskets of wicker to light their way in the dark.

Snakes have been used as ornaments, the small inoffensive green snakes being the most popular, on account of their beauty and harmless nature. They coil around the arm, clinging on with all the tenacity of their golden, jewelled imitators that are now so fashionable. Animals, or parts of them, though naturally the adjuncts of barbaric splendor, are greatly used in the make-up of fashionable toilets of the present day. Some of the handsomest sleeve buttons and studs are made of polished fish skin—sharks or dog-fish being preferred, as they take a fine polish, and closely resemble the fossil coral Favosites, that is also used, and when highly polished the delicate cells that were once the home of the coral polyp are distinctly visible, and as a whole resembles honeycomb.

An expensive costume was a cape made of an extremely rare humming bird. The whole bird was hardly larger than one's thumb, and on its breast a single patch of gold was found about an inch in length. The cloak was composed wholly of these patches, and in the sunlight must have vied with the golden fleece. The birds are valued at \$50 each.

A lady in St. Augustine created a sensation by appearing in public with a chameleon resting on her headress, and held there by a delicate silver chain. The little creature was perfectly tame and made no attempt to escape; but when touched by other than its owner, its throat puffed up and curious waves of color passed over the whole body, ranging from deep green to a dark brown. Small lizards are used in Egypt by some of the native ladies as ornaments, and lie half concealed in the drapery that overhangs the face. The red clawed soldier crabs are sometimes used in Mexico as pins. The crab is disengaged from its stolen shell and given a beautiful pearly one, or one that has been plated with gold or silver. Fastened to the lace by a pin and chain, they make unique ornaments.

Diamonds and Precious Stones.

Translated for the JEWELERS' CIRCULAR from the French *Diamants et Pierres Précieuses* par Louis Deslauriers, Professeur de Géologie et Minéralogie à la Faculté des sciences de Marseille, 2me éd. Paris, 1874.

HISTORICAL SURVEY OF PRECIOUS STONES FROM THE MOST REMOTE TIMES OF ANTIQUITY TO THE ERA OF MODERN CHEMISTRY—NOTIONS ENTERTAINED BY THE ANCIENTS AND DURING THE MEDIEVAL AGE CONCERNING THEIR NATURE AND PROPERTIES.

When we read the annals of ancient times and observe the events passing around us, we will be struck with the fact that brilliant objects have ever been coveted by man. It is in the nature of things that precious stones especially should have been gathered and employed as ornaments from the remotest time—the very cradle of humanity.

Precious stones are only used at the present day as ornaments and for mechanical purposes for divers instruments in the industrial arts. In ancient times, however, they played a far more important part. Marvelous virtues were ascribed to them, either in the physical order, such as curing diseases, etc., or in the field of metaphysics, being able to influence the actions and sentiments of individuals, etc.

If we consider solely from our modern standpoint the opinions of the ancients on this subject, we would be forced to draw very painful conclusions when contemplating how completely bewildered the spirit of man may become; but when we follow the chain of ideas throughout ages, we perceive that they often proceeded from the true starting point.

Impatient to elevate himself from beyond the sphere to which he was confined man has forever sought to raise the veil that shrouded the future from his gaze; poor and inexperienced architect though he be, he even essayed to raise a temple to Truth; but when material failed him, he sought to replace by presumptions and hypotheses what he could only obtain from practical experience. Thence all the profound errors met with in every ramification of human ken. Each century adding its contingent of positive truths, however, the different parts of science are gradually establishing themselves. But we, modern men, who have the great good fortune of being born at a time when sufficient material has been collected and placed at our disposal, let us cherish the most profound reverence for those ancient times, especially for the middle age, during which were evolved, in the bosom of a most violent and incessant persecution, the greater part of those grand ideas, the development of which we see in our own epoch, and the effects of which, ever swelling, lead man to a marvelous destiny.

Before throwing a hasty glance on the history of precious stones, from the origin of mankind to our own era, it is necessary to recall a few general facts, either too little known or too much forgotten in our day.

One fact governs all ancient history—the closely interwoven alliance of religion with science. It is one of the distinctive features of antiquity, and in it may be found the solution to many vagaries of the human spirit.

Among the grand false or mistaken tenets of the ancients are two that merit the entire attention of the philosopher and historian, because by this assistance he is empowered to solve a number of problems, which considered by themselves, would appear inexplicable, and to unite by an unbroken chain of logical reasoning the general entity of both physical and metaphysical facts.

The first consisted in considering man (*microcosm*) simply as a reduction in miniature of the entire universe, (*macrocosm*), and in presuming that the different parts of his body had their counterparts in the universe.

The second was the supposition of a soul of the world, of which the souls of animated beings were but parts. "At the moment of dissolution of the body," said the Hindoo philosophers, "the soul, *atma*, very different from the purely vital principle, will reunite, if it be pure, with the grand universal soul, *paramatma*, whence it emanated; if impure, it will be condemned to undergo a certain number

of transmigrations, that is to say, to animate in succession plants or animals, until cleansed of all its imperfections, it is deemed worthy of *moucti* of an absorption into Divinity." These philosophers thus deemed minerals as well as animals and vegetables to be living beings. They held also that this world is an animal embodying the two principles, active and passive.

These theories passed from India into Egypt, and were afterwards transferred into Greece by Plato and Pythagoras. Remaining confined for many centuries in the Orient of Europe, they reappeared with some brilliancy toward the commencement of the present era in the writings of the philosophers of the Alexandrian school; especially during the mediæval age, when the alchemists also claimed them for minerals, they held undisputed sway.

It is easy of explanation, therefore, with the aid of these theories, how the ancients were led to suppose, in a general manner, the direct influence of the universe on mankind, and even that of a certain substance, component of the universe, upon that part of a man's body which they deemed corresponding to it more particularly.

If we next examine into the theories of the ancients concerning the nature of precious stones, we will perceive that the latter necessarily were held and regarded as of great importance. The precious stones, produced by the agency of heat, cold, humidity, drought, etc., received their elements from the purest sources—of the waters and minerals. Embellished by a beauty of form, a splendor of colors, they must be, and were, considered as production of an incomparable purity, the culmination of aught nature possesses the most perfect. Only one additional step was necessary to endow these marvelous productions with virtues in tenor with the exalted theories concerning their nature and origin. It was easily taken.

"It would not be without interest to follow the history of gems throughout that of mankind, from the epoch of Aaron to the pastoral cross of His Eminence, the Archbishop of Paris; from the votive offerings of rubies, sapphires, emeralds, diamonds, topazes, etc., at the shrines of Jupiter and other pagan divinities to the riches of the same nature, which before the sixteenth century had accumulated in what was called the 'treasuries' of the Christian basilicas. There is still preserved at Rome an emerald from Peru, sent as homage to the Pope, after the conquest of that country. It should be stated, however, that these precious stones, while proving the faith of the devout, have not always been religiously respected. When the Reformation of Luther, Calvin, etc., in the Germanic states, and, at a later period, when the French Revolution, in the countries which had remained under Catholic sway, ceded to the civil authorities the possession of these votive offerings, it was found that many fraudulent substitutions had taken place, and strass often represented the primitive gem." (M. Babinet.)

While cheerfully admitting the preceding opinion, it should be stated that false precious stones were often employed in past centuries, for ornamentation of religious edifices. For this purpose, Father Kirker wrote a treatise, rather lengthy, but very explicit, treating of the making of false gems, the recipes of which, if followed at the present day, would lead to good results.

"Precious stones have at all times been held in great esteem, and will doubtlessly be for all future time. If we compare our modern luxury with the splendor of Oriental courts and Roman citizens, we will find ourselves inferior in many points, diamonds excepted. Were we called upon to estimate the diamonds displayed at one of the brilliant reunions at the Tuileries, even making a liberal deduction for false jewelry, we would find that our French wealth, although more widely diffused, cedes nothing when compared to Roman riches." (M. Babinet.)

The mythology of India speaks of precious stones in terms which prove that they were held in high esteem in that country from the most remote ages. Frequent mention is made in its chants and ballads to these beautiful productions.

In Egypt, a number of gems of perfect cut and engraving are fre-

quently found in the tombs with the mummies, and must be attributed to a very early period.

Everything leads us to believe that the Egyptians pursued especially the same methods for engraving hard stones that we do to-day.

The conquerors of Mexico found in the hands of the Incas a multitude of gems cut and graven to represent animals and other objects; according to the traditions of these people the stones in question descended to them from olden times.

Of the many ancient documents in our possession, bearing on precious stones, we will cite one—the Holy writings. This extraordinary book mentions them, but the most notable passage is the description of the breastplate of Aaron. It was ornamented with twelve stones, each one of which represented one of the twelve tribes of Israel, and we here reproduce the disposition which interpreters have given to them, also their names and synonyms in English, in the opinion of the most learned rabbis:

ORDER OF STONES.

Primus Ordo.	Oden. RUBEN.	Cornelian. PHIDETH. SIMEON.	Topaz. BARKETH. EMERALD. LEVI.
Secundus Ordo.	Nophech. RUBY. JUDAH.	Saphir. SAPHIRE. ISSACHAR.	Jaslam. DIAMOND. ZERULON.
Tertius Ordo.	Leschem. HYACINTH. DAN.	Scheho. AGATE. NEPHTHALI.	Achlamah. AMETHYST. GAD.
Quartus Ordo.	Tarsisch. CHRYSOLITE. ASER.	Schoham. SARDONYX. JOSEPH.	Jaspeh. JASPER. BENJAMIN.

It is hardly necessary to mention that translators are far from agreeing upon the modern names corresponding with the Hebrew terms. The immense lapse of time, and more than all, the absence of a more minute description, will forever preclude the hope of an entire concurrence.

The Exodus states that the ephod of Aaron was adorned with two onyxes mounted in gold, upon which were engraven the names of the twelve tribes.

The book of Job contains several allusions to metallurgy, and the names of four gems. These are simply facts to be cited, but they do not justify the opinions of several interpreters who wish to make it appear that Job was a great metallurgist, and who present us the books attributed to him as a manual on physics.

We encounter in the Bible the names of a certain number of precious stones, some of which may thus be regarded in modern acceptance, while others are less rare; their correspondence with actual stones has not been well established. One of them was the stone *dahir*, which, added afterwards to the priest's breastplate, was in all likelihood analogous to those already placed in it. Another one, the stone *abel*, or *abela*, on which rested the arc after it had been restored by the Philistines; the stone *top*, or *tophis*, which issued from the fire; the stone of Moses, whence issued water in the desert, and which is, as Father Roxo in all good faith tells us, preserved in the church of St. Marcus, at Venice; the stone *betyl*, on which Jacob slept.

Seven hundred years after Moses, we arrive at the reign of Solomon, who, it is said caused the construction of the famous Temple of Jerusalem. It is very certain that many parts were embellished with gems, although the book devoted to its description omits any mention.

Two other very remarkable productions, the Iliad and the Odyssey, make several statements in regard to metallurgy, of the highest interest. The description of Achilles' shield and of the basket presented by Alexandra to Helena, betoken an already far advanced industry. Homer also mentions a number of objects which composed the ornaments of Juno, of brilliant stones. It is a well known fact that both the Greeks and Romans made use of graven jewels for seals. Several Greek intaglios cut in turquoises, onyx, and rubies, have descended to us.

From the beginning of his appearance on earth, man has been sub-

ject to disease and death—in other words, medicine is as old as humanity. It is probable that the first medicaments were derived from the vegetable, and at a subsequent date, from the animal kingdom. Mineral substances were not brought into use until long afterward. We have the first tidings of their employment a few years after the conquest of Troy.

Observation led to the discovery that certain earths, generally aluminous, administered in various ways, produced a beneficial effect on the patient. These earths were put up in little packages and sold under different names, referring generally to the places of their origin. The business soon assumed to considerable proportions; the priests of the several divinities, who have ever known how to turn to profit public ignorance for their influence and interest, laid hold upon the exclusive sale and fabrication of these nostrums. To still further attain their ends, they stamped these packages with a seal, whence the name *terra sigillata* (*sigillum*, a seal), to be found yet at this day in our pharmacies. The earth of Leinno was among the most celebrated, and sold by the priestesses of Ephesus, stamped with the seal of the goddess Diana—a goat.

The Moor Abolays has left us a catalogue of stones known to his nation, which amounted to 325. His work, translated by Jehuda Mosca, in the middle of the thirteenth century, has these 325 stones distributed among the twelve signs of the zodiac, according to the affinity which each one was supposed to have for a particular constellation. Later, a single stone was especially dedicated to each sign of the zodiac, and subsequently to each month of the year.

As the different sacred stones had, to their possessors, a number of benignant properties, as long as their corresponding constellations remained above the horizon, a simple means was adopted to render their actions permanent, by stringing them together into an amulet, and the wearer was thus protected from all harm during the entire year. The following is a list of the stones with their correspondents:

Hyacinth, or Garnet.....	<i>Aquarius</i>	January
Amethyst.....	<i>Pisces</i>	February
Jasper.....	<i>Aries</i>	March
Sapphire.....	<i>Taurus</i>	April
Agate.....	<i>Gemini</i>	May
Emerald.....	<i>Cancer</i>	June
Onyx.....	<i>Leo</i>	July
Cornelian.....	<i>Virgo</i>	August
Chrysolite.....	<i>Libra</i>	September
Aquamarine.....	<i>Scorpio</i>	October
Topaz.....	<i>Sagittarius</i>	November
Ruby.....	<i>Capricornus</i>	December

It is highly probable that the origin of this superstition arose from the twelve stones of the ephod of the High Priest of Israel. The Jews, apart from the rest, have still another more extraordinary one, and which is another proof positive how tenaciously an idea may become rooted for an infinite time, when it is protected by the sacred egida of religious tenets. They held that on the day of one of their feasts, when the High Priest begged for forgiveness of sins for the people from the Most High, if the pardon was accorded, certain sacred stones would glitter with great brilliancy, while, if the supplication was refused, they would turn black.

This was certainly not an illusion of the Jewish nation. It is evident that this effect could be produced, without the necessity of an intervention of Divinity. It is well known that a number of means are at command to produce this result. At any rate, it was a piece of legerdemain, both simple and ingenious, to completely keep the nation well in the hands of the priest, but the robust faith of the age was necessary to believe in the supernatural effect of this manifestation. Before criticizing too harshly, the reader might look around him to see if he do not encounter superstitions tantamount to those mentioned.

Herodotus, born 484 years B. C., five centuries after Homer, has left us a large number of documents, often very precious, on the min-

eral substances known in his era; but we do not find anything that is new in them, bearing on precious stones.

In the poems of Orpheus, also attributed to Onomacritus, which in any event ascend to 450 years B. C., we encounter evidences that the Greeks attributed supernatural powers to precious stones.

In the following century, Plato, whose vast intellect embraced so many noble ideas, was led to examine the origin of precious stones. He held them to be veritable living beings produced by a sort of fermentation determined by the action of a vivifying ether descended from the stars. He claimed that the diamond, distinguished already among precious stones by a superior place, as being a condensation, a kernel, formed of the noblest and purest ether, within gold, which had been congealed into a transparent mass.

Theophrastus, a disciple of Aristoteles, wrote a treatise on gems, in which he advocates the singular idea of their possessing sex, dividing them into two categories—male and female.

Notwithstanding the great value of the writings of Dioscorides, who lived in the first century of the present era, he states nothing new or until then unknown; he is the first writer, however, who mentions that precious stones are possessed of a multitude of hidden virtues—a belief still entertained by the inhabitants of the mountains of Spain and Arabia.

A few years, however, after Dioscorides, appeared another work, superior beyond comparison to any hitherto known. The *Natural History of Plinius*. It is unquestionably one of the most admirable writings bequeathed to us by antiquity; it contains a chapter exclusively devoted to precious stones, and we will recur to it in some future chapter.

From Plinius, we pass through six centuries, and arrive to the Arabs, for new dissertations on mineralogy and precious stones, which we find in the writings of Gerbert of Avicenne, who is distinguished for his eminent researches in the field of mineralogy.

Two hundred years after Avicenne appeared one of the greatest figures of the Middle Age—Albertus Magnus, or the Great. Among the immense works which we directly owe to this man of genius, or, at least, to his initiative and direction, must be cited *Traité des Minéraux*, and in this Albert occupies himself with precious stones. De voting a large part to the consideration of their extraordinary properties, he discusses with care a certain number, and gives methods to make false ones.

(To be continued.)

Guide for Watchmakers' Apprentices.

BY HERMANN SIEVERT.

[Continued from page 158.]

THE PENDULUM.

Of all swinging bodies standing at our command, none is so well adapted to be used for the measurement of time as the pendulum, because its motion is the most uniform and simple. A pendulum is a body suspended at the end of a thread or flexible rod, making motions to and fro, in obedience to a given impulse.

The pendulum motion is the effect of two causes, the force or attraction of gravity of the earth and the inertia of matter. A motionless pendulum hangs with its center of gravity vertical to the earth. If driven to one side by a power applied, force of gravity will endeavor to draw it back to its vertical position. On account of the inertia of the matter, it cannot stop its own motion, but must continue to swing until attraction has conquered inertia, and draws the pendulum to its former position. The inertia of a body in motion is equal to the force which produced it, deducting the friction of suspension and the resistance of the air. If a pendulum could be suspended in a vacuum, without friction, it would continue to swing forever, when set in motion. But since a suspension void of all friction (cutting through and displacing the air must be classified to this) is impossible, it becomes the watchmaker's task to reduce it to

a minimum, as well in the style of suspension as in its ability to displace the air. Nevertheless, be the friction ever so small, a pendulum would gradually lose its motion, if no certain constant force were applied to it by the escapement of the clock. We will see farther on how this is done.

The weight and large part of a pendulum must receive a suitable form to enable it to easily cut through the air. This part, which is formed of two circles intersecting each other, is called the bob. It describes an arc in its motion, whose radius is the rod. The larger this arc, the greater is the resistance offered by the bob to the force of gravity, and the stronger will it influence the return motion. The velocity of motion increases with the extent of the arc, and to such a degree that a freely swinging pendulum will make its greater and smaller oscillations in nearly the same time. As will be seen farther on, a slight difference is caused only by friction, and certain natural laws, as well as by the wheelwork. The smaller the radius, or, in other words, the shorter the rod, the more circular is the arc described by the bob, and the greater is the fall with which the bob, with the same extent of arc, or by the same distance passed through, approaches the earth. The student may verify this by a comparison of two segments of equal length, but of unequal radii. The consequence of this greater exertion of gravity upon the shorter pendulum is that it accomplishes its oscillations within a shorter period. The number of oscillations within a certain time does not, however, increase in the same ratio, but

"The lengths of two pendulums are proportioned to each other inversely as are the squares of their oscillation numbers."

That is, if one makes two swings, while another one makes one, the latter one is not twice, but four times as long as the first. If one pendulum makes two, while another one makes three oscillations, their lengths are proportioned as $3 \times 3 : 2 \times 2$, or as $9 : 4$. Consequently, if we know the length of one pendulum with known duration of motion, we may find for each amount of oscillations in a determined time the length of the pendulum. These lengths are mathematically calculated—thus a seconds pendulum, or one making 60 oscillations per minute, is 994 mm., or nearly one metre long. I wish to state here that the motion to one side is called an oscillation.

We will next examine the different parts of a pendulum clock, and I will try to explain to what conditions they are submitted, in order to comply with their functions.

The Moving Power.—The moving power is best imparted to the wheelwork by a weight suspended at the end of a cord, and whose other end is fastened in a drum; this again is provided with an arbor which outside the plate is fashioned into a square, for the purpose of being wound up with a key. The operation of winding places the cord in closely lying folds around the drum. A weight moves a clock during its time of motion, from one winding to the other with equal power. Of course, the length of the cord has no influence upon the power exertion, its trifling weight cannot be taken into account; and the power exerted is uniform at all times, because the falling weight always operates upon the same length of lever, the radius of the drum, save when the cord should have by accident doubled over each other. Upon the arbor, easily to be turned, without shaking, however, and near the drum, is placed the main wheel. To prevent the falling weight from simply turning the drum without taking the wheel along, the latter is provided with an obliquely toothed wheel, the ratchet, into which catches a click fastened to the main wheel. It is pressed gently against the ratchet by a spring, the click spring, but easily slides over it at winding. As soon as this performance ceases, the clock retains the drum, as the position of the ratchet teeth and click do not permit a turning to the other side. The whole contrivance is called the clickwork. Consequently, both drum and main wheel must move together as if one piece, during the going of the clock.

A clock whose length of case does not admit the use of a weight, must be impelled by the elasticity of a steel spring. It is wound spiral form, and in its run down condition lies on the inner wall of

the spring barrel, which hinders it from uncoiling any farther. The outer end of the spring is fastened to a hook to the wall of the barrel. Similar to the drum, an arbor passes through the barrel, the winding square, increasing in size within the barrel and forming the core, to which the inner end of the spring is fastened by means of a hook. When being wound, the spring places itself in concentric folds around the core, and leaves the barrel wall. It will seek, by reason of its elasticity, to regain its former position, and draws the core in one, the barrel in another direction. There are two kinds of barrels, when fastened to the plate, one kind is provided with a click, in a manner similar to that of drum and mainwheel; the other kind, the movable barrel, is inseparably connected with the barrel wheel, one piece. The clickwork is placed outside the plate in such a one. The ratchet with its square hole is placed upon the winding square, and is kept in position by a bridge lying upon it. The click moves upon a screw with two shoulders, to permit its being screwed down without binding the former. The screw must never be loose, if not, it might unscrew altogether, and the consequent uncoiling of the spring would occasion great damage. If the click is cramped but sufficiently strong, we make it thinner; if not, another screw. It is also necessary that the hole in the click should be a trifle larger than the shoulder of the screw upon which it moves, to give it some shake backward and forward. This is for the purpose of letting the click drop in as soon as it has arrived at the point of a tooth. It may happen, if it moves too scant, that it remains hanging at a toothpoint, and does not permit the wheel to go back immediately, being incapable, at the same time of retaining it. The choice of the place where the click should catch is of great importance by the clickwork. A power operating upon the circumference of a disc in propelling or retaining is of greatest effect when it operates in a tangential direction. The sketch, Fig. 9, will elucidate this; the straight line, a, b is such a tangent, which touches the periphery only at one place and stands at right angles with a radius drawn to that point. If the circular disc is intended to be retained from point a , it will be seen that prop a, b acts with more resistance than a, c , while a, d is entirely useless; and we thus obtain the true dephing place for the click. Fig. 10 further illustrates this. The least pressure is brought to bear upon both click and screw in such a position, as well as upon the arbor pivot and its hole in the plate. The right length of the click may easily be judged by remembering that b, a and b, f should be the limbs of a right angle. It may be a little shorter without serious damage, but it should never exceed a certain limit. But the retaining point should never be placed beyond the tangential point; it would be forced out of its place sooner or later by the power of the mainspring. The clickspring should not be charged with functions of retaining; on the contrary, it must be weak, and only falls near the motion center of the click, that its sliding motion be gentle and take place with as little friction as possible.

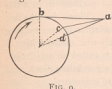


FIG. 9.

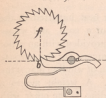


FIG. 10.

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The operating face of the ratchet tooth must concur with the radius of the wheel. A tooth of greater inclination would not hold as well; a dull one would permit the slipping out of the click. The click point is exactly fitted into the toothspace, and we prevent with care that the tooth point alone should have to resist the pressure. All side faces should be well filed at right angles to the surface, and the operating faces especially should be vertical to the level of the wheel, that the inclined faces in their operation do not press wheel and click sideways and slip by each other.

A suitable temper (blue) will give the click a greater resistance. The wheel, when of suitable diameter and thickness, may be of brass.

The power of the spring or weight is easiest resisted at the end of a longer lever, consequently by a longer ratchet. The clickwork of the main wheel and of fixed barrels is generally provided with a large wheel, and will be found best suited; they must, however, be subject to the general principles governing them.

The pivots.—The wheelwork transmitting the power is supported upon pivots resting within the holes of two plates. They must be much stronger for the first wheels, partly for the purpose, as they have to resist a stronger power, to protect them against breaking, partly to distribute the strong pressure, which would soon destroy a small metallic surface, upon a larger one. The friction of a pivot consumes power commensurate with its thickness. It might be supposed that the strength of a pivot would decrease in the same ratio as its power. The number of revolutions decreases inversely with the decrease of power, hastening the wear of the rubbing parts. Proportionally very thin pivots and their holes will be found, in spite of very gentle pressure, to wear out much sooner, on account of their quicker motion.

On the one hand, no important obstacle in the shape of great pivot friction, should be opposed to wheels with small power; on the other hand, all due care must be had to guard against rapid wear by increased velocity. Experience has established a mean; pivots may decrease in an insignificant degree where no fears of fracturing need be entertained. Owing to the great diversity of watches, no fixed rules can be given, but the necessary judgment must be formed by comparing the different movements. This much may be said, that a well hardened and finely polished pivot fitting in a well polished hole of good hard brass, may be thinner than one of softer temper and less polished.

It must be of uniform thickness to fit well throughout its whole length. Since the hole is generally rubbed up a little with the reamer, tapering in shape, it may be corresponding; not so much, however, as to be noticeable.

If there is a pivot in the clock lacking the necessary form and polish, or as happens in old ones, which has become worn and rough, its conditions must be restored by turning. When finished, it is not to be recommended to use a pivot file with cut to any extent, as the pivot might become misshapen. You will therefore turn it as smooth as possible, removing only the last few marks with the polishing file. For practice the apprentice had better exercise on some old material. The polishing file has no cut, but is sharpened by being rubbed upon a lead plate strewn with emery. Much depends upon the sure guidance of the file, to retain the faces even. It is well to have several polishing files on hand, which are sharpened with emery graduated from coarse to fine, to be used in succession. Larger pivots are best polished in the lathe by means of these files and oil. Pay great attention to holding the file, and by repeated inspection satisfy yourself that you do not ruin your work. Smaller pivots may also be polished in the lathe, by using special chucks, of which Fig. 1 gives you a sketch. The screw may be regulated in accordance with the pivot thickness, and serves as a better support for the file. No trace should be visible after having finished the pivot. Its ends are generally rounded off and polished likewise; this is done in a chuck provided with holes, as shown in Figs. 2 and 3. The chuck should not be hardened, so as not to ruin the pivot.

The pivot shoulders are somewhat broken for the obvious reason that the arbors do not rest with too great a surface upon the plate. They should not be too small, however, as to retain the oil added to the pivot to lessen the friction. It is better, moreover where larger bodies, wheels, or pinions, are in immediate proximity, to turn the arbor behind the shoulder somewhat thinner, to prevent the oil from

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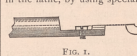


FIG. 1.

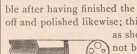


FIG. 2.

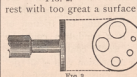


FIG. 3.

being attracted by the weightier body. Do it at the time of turning the pivots, and before polishing them.

Pivot Holes.—These are the points of rest, the motion centers of the wheels, and require, since they determine at the same time the depth distances, our special attention. A pivot hole must be round, clean, and smooth, to retain no dirt. The hole on the outside of the plate is provided with a deepening—the oil sink, which must be deep enough to enable the pivot to reach into it with its rounded end. The hole must be a trifle larger in diameter than the pivot, so as to occasion no cramping, and to afford room for the oil. The pivot, however, should not have an excess of side shake, as to produce a trembling of the depth distances.

If, therefore, the hole walls are fissured, too large, or as occurs in old clocks, elongated, they must be bushed. Every hammering or punching, to decrease the size, is strictly prohibited. We use the best hammered plate brass for this purpose. In bushing, the motion centers of the holes must not be changed, except it be done intentionally. The bushing must be round, and turned bushings comply best with these conditions. The hammered brass, found suitable, is cut into strips, and you will find it of advantage if you prepare a number of such strips at one time, provide them of different thicknesses and with rows of different sized holes. Then simply find a hole of fitting size, which must be rubbed up a little. When the pivot fits into it, saw off the piece in question, and turn it round upon the center arbor. It must be left a little larger than the hole requiring to be bushed, a trifle tapering, and turned as thin as is compatible with its retention. Next rub up the hole to be operated upon, until the thinner end of the bushing may be pressed into it. But be extremely cautious when doing it, to keep the hole vertical to the plate. Every hole is operated upon from the inside, and the bushing also is inserted from it. To prevent a future coming out, rub up the outside of the hole a little with a pointed three-cornered sinker. The fastening in of the bushing is not done immediately with the hammer, but by setting a flat punch upon it, as the hammer might easily leave traces upon the plate. If the bushing was turned well and not too tapering, it will be easy of insertion. Now reverse the plate, and lay it upon a flat, well polished anvil, and rivet the bushing by slight taps upon the round or flat punch, in accordance with the size or shallowness of the oil sinks, until the mentioned small countersink produced by the use of the three-cornered sinker, is filled up. The bushing cannot be pressed out again, even when the oil sink is restored to its original depth. Should the length of the pivot permit, it is very desirable to make the oil sink clean and smooth, so as to be easier cleaned. A pivot, however, otherwise not too long, must not reach too far into this sink, and in such a case you must keep the bushing a little thicker. The sinks so made will become smoother and better in proportion with the polish of the cutting face of the sinker. The bushing may protrude somewhat from the inner side of the plate, if necessary, else made bevel, or countersink a little, in accordance with the state of things. If a ring should become visible around the bushing, it is a sign that you have removed the sharp feather edge created by the rubbing up of the hole. This, therefore, should not have been touched. A bushing well made should hardly be visible.

The hole will have become somewhat drawn together, when the bushing was feathered. Rub it up carefully until the pivot fits into it, that is, in such a manner as to permit the arbor a little motion toward all sides, but notice with care to keep the hole vertical. The pivot would not rest with its entire length, but with only one point, in an oblique hole, and this would, consequently, become too large again in a short time. The reamer destined for the last rubbing up must be sharp and without flaw. One with injured edges would make an uneven, flawed hole. Having rubbed up sufficiently, smooth the sharp corners arisen on both sides with a three-cornered sinker, to better admit the cleaning wood for cleaning. Should the hole re-

quiring to be bushed, as in mantelpiece clocks, be too small to turn the bushing upon an arbor, a so-called screw bushing must be made. The hole is rubbed up somewhat and provided with a screw-thread. For material we do not take common brass wire (this turns black when touched by oil), but good bushing wire, or, in its absence, a strip of good plate brass, filed round. Having provided it with the corresponding screw thread, and at the same time filed its end flat in the screw plate, we ascertain its center. Our next difficult task is to drill a hole into the wire which we hold in a pin vise, fully as long as we have cut the thread. When the bushing has been inserted in the plate, and on inspection we should become satisfied that the hole has been drilled in obliquely, the former must be withdrawn again. As this manner of drilling a hole straight requires much practice, I will recommend another method. After having tolerably straightened a piece of bushing wire, and upon one end we have filed it pointed, upon the other one flat, place it into the lathe, and drill in the corresponding hole by means of the wire. When done, insert an arbor into the hole, and turn the bushing as you would do with any other. If well made, it fits as a screw bushing, and offers the additional security that by inattention the motion center of the pivot does not become displaced.

[To be continued.]

Self-Illuminating Paint.

ONE of the great attractions, says a correspondent, at the Exhibition of patented articles, at present held in Frankfurt, is an unassuming little frame building, which, by its modest style of architecture, does not betray its comparatively great interest within—it is devoted to the invention of Mr. Balmain. It is divided inside into two apartments, one of which is filled with objects painted in this self-illuminating paint, such as business signs, match boxes, clock dials, etc., while the walls of the other one are painted entirely with it, and a weird-like effect is produced upon issuing from the dark into this thus illuminated room. The walls give out a very pretty blue light, upon a recent exposure to the full influence to daylight, which after a while fades somewhat, and at last becomes white, which color it retains for many hours. The bright blue phosphorescence may be restored by opening the doors for a short time.

Mr. Balmain, the director of the alkali works (England) is by no means the first who has discovered the property of a phosphorescence of chemical bodies; this fact was known already in antiquity, and we know that already in the 17th century, chemists experimented with such, which they called light imbibers or light magnets.

The invention of Mr. Balmain consists in producing a body which is capable of great illuminating power, and upon which atmospheric influences have no effect whatever; which may be exposed without fear to the air, humidity, etc. It has already found a manifold application, for match boxes, thermometer scales, clock and watch dials, and other objects, and is of great importance for the marine, sea, and river buoys, life saving boats, ships' signals, and such other as have been painted with the color, with the most happy results.

Brown Brass.

THE *Mettallarbeiter* publishes the following recipe to produce the favorite brown tone upon brass: The article after having been thoroughly cleaned and freed of all traces of grease, then polished, is dipped for about $\frac{1}{2}$ minute into a cold solution of 10 grams of hypomanganate of potash, 50 grs. green vitriol, 5 grs. manganic acid, and 1 liter water; then rinse well and dry in fine soft sawdust; if a reddish cast is desired, dip the article into a second bath heated to 60°C., of 10 grs. chromic acid, 10 grs. chloric acid, 10 grs. hypomanganate of potash, and 50 grs. blue vitriol (sulphate of copper) dissolved in 1 liter water. The latter mixture alone produces a light bronze. The article may afterward be heated in an oven, which operation, it is said, produces a very rich tone.

The Art of Coloring Cornelians, Chalcedonies, and other Kindred Minerals.

IN the name of *Gemma*, the ancients embraced more precious stones than we of modern date do by that of jewels; this only comprises precious stones which, from their color, transparency, fire, hardness, scarcity and other properties, are eminently qualified to serve as adornments. The ancients held in high esteem the many varieties of quartz (half jewels) parti—as well as singly colored, or veined, cloudy, or spotted, because they furnished an excellent material for the pursuits of art, and as being better adapted to the art of cameo cutting. Pliny mentions an agate which, with its natural spots, represented Apollo surrounded by the nine muses. It is not a matter of astonishment that the ancients should have practiced every means within their knowledge to alter or heighten the colorization of the various tinged quartz classes, and, indeed, Pliny states that there is no falsification as lucrative as that of artificially coloring gems. They were manufactured of glass and paste, and cemented upon tablets; especially the sardonyx was much imitated. The same author states that, among other manipulations, the quartzose gems were boiled in honey for seven days. The agate cutters of Idar and Oberstein made use of the same means to change feebly-colored gems—chalcedonies, cornelians into pronounced and very beautiful onyxes. The gem cutters of Italy in former years visited these gem-producing regions and eagerly bought up everything in the market, as they understood the art of artificial staining, until some traitor among them gave or sold away the secret which Pliny already mentions as being practiced at the time of the birth of Christ.

This art is based upon the peculiarity that some of the bands of the chalcedony are more porous than others, and will imbibe coloring fluids, whereby they may be changed into onyxes, specially adapted to cameo cutting, owing to their different shades; and even agates intended for other purposes, may be considerably enhanced by the procedure.

An empirical way of ascertaining whether a stone will imbibe color is practiced by the gem merchants, by breaking off a small piece and wetting the larger one with the tongue; if several strata imbibe the fluid, the stone is deemed good. Very large ones plentifully veined, especially those containing red streaks, are valued highly, increasing with the number of veins. One was found in 1844, weighing 100 pounds, which sold for \$600 on the spot; it was cut into cameos, at an expense of \$150, which brought, when sold, \$2,000.

The coloring is done in the following manner: The stones are first washed very clean, to free them from all extraneous matter, and dried in the ordinary temperature; they are next immersed in a solution of honey and water; the pot must be new, or at least, very clean, above all, free of grease. It is placed into hot ashes, or upon a warm stove, the fluid, however, must never come to ebullition, and the stones are at all times kept under water by adding a quantity every day or two, to replace that which evaporated. The stones thus are left for two or three weeks, then taken out, washed, and put into another pot, into which sulphuric acid is poured, to completely cover them. The pot is covered with a slate, placed into the hot ashes, and surrounded with live coals. The larger so-called soft stones will be found colored within a few hours, others require an entire day, while again others do not become stained. When to satisfaction, the stones are taken out of the acid, washed, dried upon a stove, cut, and put into oil for a day, which causes any previous little cracks to disappear, and the stone becomes more fiery; the outward oil is afterward removed by rubbing with bran.

The previous insignificant-looking light grey veins will, in proportion to this porosity, be found stained brownish grey or black; the white ones have turned purer, and their veins have become brighter in color. The chemical process which took place is very easy of solution; the honey penetrated into the pores and has become carbonized by sulphuric acid. White and many red streaks appear to be impermeable, but the intensity of their color is heightened,

The so-called Brazilian cornelian is also "cooked" as in the preceding manner. Great quantities of the crude stone are imported into Northern Italy, and those adapted to cameo cutting bring high prices, sometimes \$2,000 per cwt. These cornelians contain an oxyhydrate of iron, and are generally entirely unimpregnable; the reddish tints are often deadened by being carbonized, and either are not visible, or appear as an admixture of the grey and black colors, hence they often play into brown.

Pliny, who simply speaks of the method from hearsay, mentions the treatment by honey alone, and omits the sulphuric acid, without which, as is clearly perceptible, no colorization can take place. But as his mention may be accepted as proof positive that the Romans understood the art of coloring, we may go a step further and accept that they were also acquainted with sulphuric acid and its action. No direct proofs can be cited, but the acid is, as is well known, a product of volcanoes, and it is not difficult to imagine that they fully understood it, since they were very well acquainted with sulphur and the natural sulphurets. If they possessed no direct sulphuric acid, they at least were acquainted with solid and liquid substances which contained the free acid, and which answered their purposes.

In the already mentioned districts of Oberstein and Idar, the parties engaged in the art also understand how to produce a beautiful citron yellow. The following is the process: The stone is dried for several days upon a stove, which must not be too warm, however; it is next put into a clean pot, which is filled with commercial muriatic acid; a cover is cemented over it with clay, and the pot is left untouched for two or three weeks, remaining in a warm place. The chemical action is open to debate, whether the yellow color is produced by a salt in the acid, which unites with some free element contained in the stone, or whether the coloring principle is contained in the acid itself, and is imbibed by the stone.

Among the gems cut by the Greeks and Romans, many specimens are found with blue veins. It is supposed that they were colored artificially, but the secret has died with them. The cameo cutters of Idar use the following method for blue: The stone is placed into a solution of salt of oxide of iron, and afterwards saturated with a solution of prussiate of potash. The color called Prussian blue is thus produced.

Or a solution of ferrous salt is made. The stone is placed at first into a solution of prussiate of potash, chloric gas is conducted upon it, whereby potassium ferridcyanide is produced, which, when the stone has been saturated in the solution of ferrous salt, produces Prussian blue, and colors the different bands. A third method is used which gives an evanescent color, by conducting a gaseous solution of prussic acid upon the stone saturated with a solution of chloride of iron. The method is dangerous as well, owing to the poisonous qualities of the acid.

The color in agate, chalcedony, and Brazilian cornelian may also be altered by exposing them to a gentle heat. The white chalcedony often becomes purer of color, the red tints become more pronounced, and the dead yellow will change into a beautiful red, which is especially the case with the cornelian, whereby a veined stone is changed into a handsome cornelian, and a single colored one receives its true cornelian lustre and fire. The following is the method: The stone is placed for two or three weeks upon a hot stove, and its water thoroughly dried out, then it is put into a crucible and dampened, not saturated, with sulphuric acid. The cutter simply dips the stone into the acid, and places it into the crucible. This is well covered and placed in a strong fire until red hot; the fire is permitted to die down slowly, and the crucible is taken out only when thoroughly cold. The burning effects a thorough anhydrous of the oxyhydrate of iron, which permits the color to become more lustrous and to assume the peculiar cornelian tint. Smaller articles are burned before being cut; larger ones, such as dessert plates, vessels, vases, etc., after cutting; for the reason that smaller articles are not liable to crack, larger ones will, however, and it is sought to reduce them as much as possible by cutting.

To Regulate a Watch for Common Use.

BY MORITZ GROSSMANN,

*Watch Manufacturer, Member of the British Horological Institution of London.
Honorary Member of the Upper Italian Horological Union Galilei.*

CONCLUDED.

CHAPTER V.

REMARKS ON REGULATING ANCHOR WATCHES AND THE DIFFERENT
REGULATOR SYSTEMS.

The anchor watch is, of all movements of which a close rate may be expected, the most widely diffused, and since it offers various difficulties inherent to its nature, when regulating it in the different positions, I would make a few remarks especially with reference to anchor watches.

The distinguishing feature of this escapement is the fork united into one body with the anchor, and it may be observed in many watches that notwithstanding the counterpoise attached to the fork, this body is far from resting upon its axis in perfect equipoise. This incorrectness, as may be seen, does not permit a regulating in both positions, and it is necessary, before attempting to regulate, to place anchor and fork into the balance scales, and to establish, in case it does not exist, the equipoise in some suitable manner.

Next must, in anchor watches, be considered those errors which arise in certain positions, such as a slight grating of the guard pin in the guard hollow, or of the ruby pin within the fork's horns, or upon the bottom of the fork's throat. Defects of this kind may easily be discovered by the ear; any strange noise is suspicious, and he who is accustomed to the free, sharp ring of an anchor watch, will detect at once any scraping sound mixing with it, and will not remain satisfied until he has discovered and removed the cause.

The balance, also, must be scrutinized by an attentive eye. A balance which does not run truly circular, whose rim does not everywhere show an equal breadth and thickness, or one in whom steel and brass are unequally divided, will be found useless for a close regulating. Very proper and useful will be found the balances manufactured in Glashütte by Mr. C. Kohl. Its regulating screws are placed within longitudinally incised holes of the balance rim. A delicate incision in the direction of the plane of the balance is made through the screw-holes, thus that this has a small springing virtue, which enables the screws to move very softly, without the danger at the same time of becoming loose.

It is not necessary, when withdrawing or inserting the regulating screws, to take the movement out of the case; simply seize the balance rim at the place where the screw to be operated upon is placed, with a pair of tweezers, and make the alteration thus that no side pressure upon the balance rim or arbor pivots takes place; very delicate and sharply filed screwdrivers are necessary for the purpose.

The regulator plays an important part in the regulating. I have known many a juvenile colleague who tried in vain to reduce a watch to a regular rate, simply because he had not bestowed sufficient attention to the regulator. It is well known that it should move with a uniform pressure, neither too hard nor too loose. Equally well known is the fact that the outer coil must lie exactly in the circle described by the regulator pins. It appears, however, very unimportant to some whether the regulator pins stand far apart or close together, yet this is productive of many irregularities in the rate. The regulator pins never must squeeze the balance spring, else it would be brought into an unnatural position with each moving of the regulator. Equally objectionable is an undue width of the regulator fork. Let us suppose one which is too wide, with the balance spring lying free between, and it stands to reason that with small vibrations, the entire length of the spring is in action, regardless of the presence of the regulator; the spring would only touch the regulator pins in more

extended vibrations, and an acceleration would take place. If, however, the regulator fork is too wide, and the spring is placed against one of the pins, it will not, in small vibrations, proceed from the pin, and approximately operate thus as if its length only reached up to the pin. It will proceed, in its larger vibrations, from the pin, and a retardation in rate for these vibrations will be the result. Watches that have been carelessly treated in this particular, always show an important difference in their rate between the full winding of the mainspring and the effect of the few last coils. Care must also be taken, if stress is laid upon a good rate, that the pins are at all times clean and free of oil or dirt, because a slight glueing of the spring at these parts may generate other irregularities.

The deduction may be drawn from the above that the regulator fork should be kept closed, so close, in fact, that only a barely perceptible motion of the spring may be observed between.

It is highly reprehensible if the repairer, in order to retard the rate, bends the pins apart. The end will be reached by this, but the above mentioned errors are produced at the same time, while the same may be accomplished by safer and less objectionable methods.

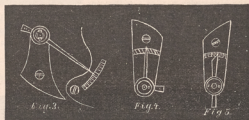
Furthermore, it must be stigmatized as a downright piece of botchwork, when the regulator pins, in case they do not exactly correspond with the position of the balance spring, are simply bent to suit the occasion. The pins in such a condition, of course, do not stand at right angles, but obliquely to the plane of the spring, and the faulty

result occasioned by such irregular touching of the spring at each vibration may easily be imagined. If such bendings cannot be obviated in any other way, the pins should be brought back to a vertical position by bending with a double elbow. (See Fig. 2.)

For a very close regulating, it is of great importance to have even the smallest motions of the regulator under perfect control, and it has ever been the object of inventive talent to find ways and means, by which even the most minute deviations are controlled by force of the regulator.

The first endeavor was to assist the eye, by disposing of the regulator graduation, not upon the balance bridge, but upon some other part of the work in such a manner that a greater radius might be given to the circle of this graduation (Fig. 3). This method, of course, is connected with the danger when the balance bridge of a well-regulated watch is removed, the position of the regulator hand is disturbed thereby.

Another method for this purpose consists in either making the dividing lines of the regulator obliquely, or consulting the point of the

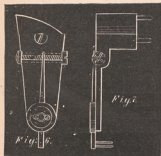


regulator hand, so far as it reaches into the partition, very broad, and making it diagonally from one side, (Figs. 4 and 5). The latter two methods are very useful; little application is made of them, however.

Beside these optical assistances, a very minute and close moving of the regulator has been sought to be obtained by mechanical means. It was sought to be achieved by a deepthing (similar to verge watches) and by means of a screw. The deepthing, however, is inseparably connected with tooth shake, and the consequent dead motion, which in itself is a great defect.

The screw has rendered better services. It was introduced in various forms and at different periods for the purpose of regulating.

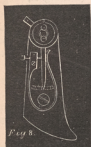
Already at the commencement of this century, M. Breguet contrived in some of his watches the regulator with screw, but it appears that owing to the small amount of exactness which was possessed by the watches of that epoch, nearly all cylinder movements and non-compensated balances, the necessities had not yet arisen to make extensive use of this correction. About twenty-five years ago, the same idea reappeared in London, and in pursuance to various inquiries, I endeavored, assisted by my deceased friend Carl Gartner, during my residence in London, to solve the question, and perfected a regulator screw, which Mr. Gartner afterward caused to be patented for



England. The screw is about 2 cm. thick, provided with a deep thread, fitting well in a hole, divided square through the balance bridge, so that after mounting the hand, about $\frac{1}{2}$ of the thickness of the screw protrudes beyond the bridge. One end is provided with a head, with cross cut, to facilitate the moving in any position. The other end is turned into a pivot, upon which fits a washer, so that the screw may be turned with

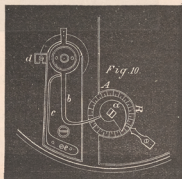
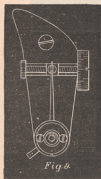
little friction. The end of the regulator hand is sharpened below, and inclined downward, to easily fit into the screw thread. The operation of this screw, if well made, is very secure and close.

Fig. 8 shows another screw adaptation, such as is applied by E. Howard & Co., in Boston. A patent was taken out for the United



States, some five years ago, for a regulator screw contrivance, which is indeed the most perfect that can be obtained by mechanical means. The screw was bedded, similar to Fig. 6, but provided with a lining, which moved to and fro. The lining contained a standing collet which moved somewhat upon its axis, and its incision accommodated the regulator hand. The screw head was very large and provided with a graduation. As is commonly the case, far more was effected with the contrivance than was actually necessary; supposing, even, that with its application no dead motion could occur, nevertheless the necessity does not exist to regulate watches for common everyday use so closely that its regulator hand should move to the hundredth part of a millimeter, since the natural sources of error of such watches are far greater than the possibility to correct them thus. Really valuable watches, of which great precision is demanded, are not provided with the regulator, because not applicable with the curved ends of the isochronous spring.

Beside the screw, we also find the eccentric as an element for the perfection of the regulator. The contrivance represented in Fig. 10,



of Tiffany & Co., New York, has no mechanical defect; it is bur-

thened with the only drawback that by every removal of the bridge the regulator flies back to an extreme position, when remounted, it is true, it assumed its wonted place.

In conclusion, I wish to add a few words of advice to the repairer. If he desires to obtain a fine regulating with prospects of success, he should also correct errors whose immediate disturbance do not at once appear to influence the rate. I mention especially an excess of shake in the parts of escapement, especially the balance. Much is sinned in this respect. Many think that it should be a matter of unconcern to a well-poised balance with good, round pivots, whether its point of rest, that is, the operating part of the jewel hole, lies at greater or less distance from the pivot end. But they forget, 1st: That when manipulating even the best watch, they deal only with an imperfect piece of work of the hand of man, and that that which a conscientious workman calls round, is not mathematically round, but round only in so far as to exhibit no irregularities to our sight; 2d: That by regulating even the most trifling deviations loudly proclaim themselves in the shape of noticeable differences. If for example, as should ever be in a good watch, the space between cover and jewel hole is very small, if the latter, that is, its operating part, is thin and well rounded, it is possible that an insignificant excess of endshake permits the pivot end to run upon the inner rounding of the hole; that a regular rate is out of the question in such a condition, will be apparent to anyone.

Good watches may be reduced to a very close rate, but they must be treated with all due care and circumspection, else they may be excelled in their services by average and current ones.

CHAPTER VI.

REGULATING IN THE DIFFERENT TEMPERATURES.

A further demand is made of the regulating watchmakers. It is required that the watch operated upon by him shall not alone preserve its rate without change in the different positions, but also in the different temperatures.

He who wishes to comply with these exactions, must, first of all, thoroughly understand the causes which have for an effect a change of rate in the different temperatures. Very singular views are often expressed on this point. Many think that it is the linear expansion of the balance and spring, which, similar to the pendulum, produces this deviation; it has, however, been established by calculation and ingenious experiments, such as balances and springs of glass,* that these factors only co-operate to a very insignificant extent.

The main cause productive of an alteration of rate in the different temperatures is the change of the elastic resistance of the balance spring. Since this resistance augments with cold, the spring becomes stronger, in ratio with the sinking of the temperatures, and the contrary results with rising. But since, other things remaining equal, the watch goes faster with a strong spring and slower with a weaker one, the same changes must occur by the rising and falling of the temperature.

Unhappily, this influence cannot with mathematical precision be reduced to figures, and the watchmaker is consequently, in his endeavors to compensate this influence, confined to trials and experiments.

Formerly, when compensation was not applied to watches, recourse was had to the remedy to regulate the watch (cylinder) in such a manner as to overpoise the balance at a lower point, so that, in hanging, it gained one or two minutes. The watch would go somewhat slower in the heightened temperature of the pocket, and thus would be, as it were, compensated. This, of course, includes two conditions, first, that the watch, when not worn, must be placed horizontally, and second, when worn, must always be placed vertically in the pocket.

Before the compensated balance was introduced into watches, the end was sought to be gained by a compensation circle at the regulator,

*NOTE.—The expansion of glass is very trifling.

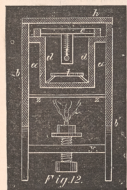
as seen in Fig. 11. But since this contrivance could only operate by reason of closing the regulator fork in heat and widening it in cold, it will be seen that the heretofore specified errors all combined to disturb the rate, and this makeshift for a compensation was sufficient as long as man could only count by minutes in watches. The rising demands for a greater exactness in watches forced the introduction of the compensated balance. This is too well known to demand a description. Even the different kinds will not be mentioned, being irrelevant to this pamphlet. Neither will we occupy ourselves with the so-called auxiliary compensation, such as is used for chronometers, but simply with the regulating for common use.

Since, as has been said above, it is impossible to ascertain by calculation the influence of the temperature upon a watch, the repairer is confined to trials when regulating in temperature. The task is somewhat easier in factories where the workman always manipulates certain numbers and sizes of springs of known power, but when placed at the bench of a shop, such an approximation is unattainable.

To practically test the virtues of a compensation, it is necessary to be able to produce all the different degrees of temperature to which a watch may be exposed. For this purpose apparatus is necessary, such as an oven and an ice-box.

I will at first describe this apparatus in its more simple form, one which may be made without great expense, and I use for this purpose the proportions given by Saunier, vol. iii, art. 1.462 and 1.463.

Oven for Heat Tests.—The watchmaker may make a small oven himself, sufficiently large for the purpose. A sketch is given in Fig.



12. In a well-closed wooden box, about 25 or 30 cm. broad and deep, with a door below at *b*, and provided with a lid at *d*, is placed in a little box *d d*, which is let in from above into the box in such a manner as to be surrounded by an empty space *a a*. This inner box is closed with a lid *c*, provided with a glass pane. Within it is fastened a thermometer; the little raise *t* serves the purpose of receiving the watch about to undergo the test. The apparatus from below is provided with a metal (iron or zinc) bottom; *y* is another bottom of wood through

which works a bench screw, upon which is placed a lamp that may be raised or lowered by the screw to suit necessities. As said, a door is placed on one of the sides, but no air draught must take place through it.

The thermometer *d d* is placed such that when the outer lid is raised it may be read through the glass pane. Manufacturers of chronometers locate the bulb of their thermometers inside the small box, while the tube is bent through a hole and is situated outside, together with the scale.

With the assistance of this sketch any watchmaker may construct his own oven to suit his convenience or fancy. Only two conditions should govern every construction, the degree of temperature must be under control and be able to be kept at that point for an indefinite period.

The ice-box is similarly constructed, with the only difference of a layer surrounding space *a a*, for the introduction of a plentiful supply of ice. It is often possible to find a suitably hot place, in winter time, in a regularly heated room, which offers a sufficiently high and equal degree during the day, while the watch may be exposed to the cold during the night.

Since watches for common use are not provided with auxiliary compensations, for extreme temperatures, a certain limit should not

be overstepped in the tests. It is a well-known fact that well-compensated balances of the usual pattern, if regulated to mean temperatures, go slower in extreme heat as well as cold. It would consequently be useless to institute tests and essay to regulate a watch to extreme temperatures, because in such a case it would not go right in mean ones. This peculiarity of the balance may already be plainly perceived in a temperature movement between 0° and +30° C., and this is consequently the limit, between which all tests should be confined.

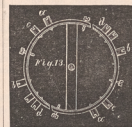
Above all, great care should be exercised in trials with artificial heat, that is, in an oven, not to have the heat irregular or too high, as the oil becomes injured thereby, and later tests consequently do not occur under the same conditions. Too great a degree of cold, even if possible to be produced, does not injure.

When it is found by carefully instituted trials, that a watch, otherwise in good order, and regulated in common temperature, loses in heat and gains in cold, it is a sign that compensation is too weak. To correct this fault, the weight of the balance screws must be moved toward a place of the balance rim where the inner or outer movement, occasioned by the changes of temperature, is greatest. It is apparent that there where the rim joins with the arm, the compensation movement must be equal to 0, but it is strongest toward the free rim ends, and in this fact is given the remedy for a correction of the compensation. When this is too weak, remove the weight screws further to the free rim ends. How much is necessary cannot be expressed in figures or calculated, but has to be acquired by experience.

When all known means have been exhausted, that is, if all the balance screws are placed so far to the rim end as its holes will permit, and the compensation is still too weak, the only conclusion can be arrived at that the screws are too light, that is, the rim is too heavy. Such a condition often occurs in balances of common Swiss watches. If reasons prevent a taking out of the old balance and replacing it by a new and better one, the only means at command is to put in a few screws of some specifically heavier metal instead of the common brass ones, and to place them near the rim ends.

Balances with brass screws, if its rim is not very thin and the screws rather large and weighty, will generally compensate weakly, and those of gold are to be preferred, not alone for this, but for the further reason that with them the weight of the balance is placed as far as possible from the center.

If, however, a trial shows that the watch wins in heat and loses in cold, the compensation is too strong. This



must be remedied in the contrary way, that is, the screws must be removed from the free ends and placed more to the inside. It is plain that by each such an alteration the two screws standing opposite to each other must be removed an equal distance, because if the balance does not remain of a uniform weight and equipoise, the advantages in regulating heretofore are placed in jeopardy.

When regulating for the temperature, no observations should be made at the commencement of less than six hours, and the same set of experiments in heat as well as cold, should be allotted the same time. When by suitable alterations the rate has been reduced to an approximate exactness, that is, the differences amount to only a trifle, it is better to observe in periods of twelve hours. Especially in winter time, it will be found very convenient to test a watch in cold during the night.

It is almost superfluous to state that in the temperatures the watch is tested only in one position—the horizontal, to prevent other errors from exerting any disturbing influences. Observations are noted in the same manner as recommended for regulating in the positions; the degree of cold or heat need only be mentioned in addition.

That the advantage gained with a well-compensated balance upon the rate of the watch is an important one, will be seen by the follow-

ing statement: A watch with a common non-compensated balance fluctuates by a difference of temperature from 0° to $+35^{\circ}$ C. in its rate from three to five minutes. One with a well-compensated balance will show a deviation of from one to at most three seconds daily, by the same difference of temperature.

REMARKS.

A regulating in the temperatures is facilitated by an adherence to several well-known axioms and customs, which I will state in a few words.

Above all, do not waste pain and labor by trying to regulate a watch in the temperatures, which contains simply one of the well-known common balances, such as are unhappily found in numerous watches of current and average make. The manufacturer has merely tried to give his ware an appearance of good quality, to which, in fact, it does not possess the least claim. With a balance which is not circular, or may be made so, whose brass and steel are disposed in unequal proportions in different parts of its rim, or not exactly proportioned in its several parts, such as having a small and heavy rim with small and insignificant screws, no satisfactory and close regulating can be had in the temperatures. Any labor in the endeavor may from the very commencement be deemed wasted, and it would be preferable if the manufacturer had never cut open such a balance.

Just as little may be expected of a balance whose brass has not obtained the necessary spring hardness by suitable manipulation. (See Saunier, vol. iii, p. 193.) It will bend and twist on the least provocation, and is of less intrinsic value than one with no compensation.

Another very serious defect, and one which has caused many a watchmaker much pain and vexation, is found in balances with weak rims and disproportionately heavy screws, especially if the rim does not possess the necessary resistance by being extra springhard. Centrifugal power forces, by extended vibrations, the free ends of the balance rim to twist outside, and this changes the motion, as it were, into one of regular oscillation. Since this occurs only in large vibrations, but not in average sized and smaller ones, it becomes impossible to closely regulate a watch with such a balance.

The screws which serve for purposes of compensation, and which are called, for the sake of distinguishing them from the four regulating screws, the four weight screws, should have at their inner end a tapering point, to facilitate an insertion. They must be screwed down to the shoulder, and in order to prevent the rim from springing, the shoulder should be rounded. But never, for the sake of establishing a counterpoise, should one of them be withdrawn. The continued trembling occasioned by the motion of the balance, and by the wearing



of the watch causes any not tightly fitting screws to loosen and at last drop out altogether. Examine the balance of every watch placed in your hands for regulating that its screws sit firmly.

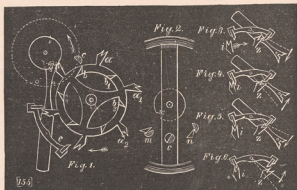
See that the screwhead cuts are clean. If any one is dirty, the counterpoise will be disturbed by a subsequent cleaning.

A compensated balance needs more room than an ordinary one, both within and without, since its inner and outer diameters change with every difference of temperature. Examine, therefore, if the requisite room is on hand, else you may find that the watch with a scantily turned out bridge, or whose motion impulse stands too close to the balance, standing still in some cold night, and you may, when the watch is brought into the warm workshop, seek in vain to discover the no longer existing cause.

Some care is necessary with a watch, more especially with a movement without a case, which has been tried for its rate in cold, upon entering the warm workshop with it. Such a watch or movement is best kept in a little box which should not be opened until it has taken nearly the degree of heat of the room. Everyone knows that cold bodies "sweat" when exposed suddenly to heat, and as a result of the want of care in this direction, many a valuable regulating has been utterly ruined by the rusting of the balance Spring, not to mention other further and serious injuries to the work itself.

The Anchor Duplex Escapement.

THE anchor-duplex movement combines properties of the anchor with those of the duplex escapement; it has a steel escapement with repose and impulse teeth, which later impart the direct impulse to the balance, (as is done in chronometer and duplex movements); the former do not place themselves as usual against the small roll of the balance arbor, but upon an anchor, which is conducted by a fork. This escapement is seldom met with, which of itself is sufficient to indicate its little value. Its advantages may easily be enumerated, it has springing seconds from the center of the dial, and the balance vibrates $\frac{1}{4}$ seconds. Its insignificant advantage is purchased with important sacrifices; but, because the balance only



receives a new impulse at each fourth vibration, and a great waste of power taken place by too great a drop. The balance never vibrates very lively, even with a strong mainspring.

Let us examine the different phases of the escapement in the accompanying cut. Fig. 1 represents it in full; the repose teeth a, a^1, a^2 , are double, that is, each of the six large teeth has two points. The impulse teeth b, b^1, b^2 , etc., stand vertically to the face of the wheel, and operate upon the faces of a flattened round jewel, which is set upon a shank of the balance. The anchor e has only small pallets with locking plane and angle; it does no lifting, as is also the case with the Robins' escapement.

The performance of the escapement is further shown by Figs. 3-6; the balance has just received an impulse at Fig. 3, while the tooth z , which lies at present at repose upon the exit pallet, was on its way thence from the entrance pallet. Fig. 4 shows how at the entrance pallet the first tooth has dropped from z , and another one rests there from i . By the subsequent motion of the anchor, indicated by arrows in Fig. 5, the second point of the tooth point i rests upon the exit pallet. In Fig. 6, the second point of the tooth i rests upon the entrance pallet, and with a farther escape tooth i makes its way to z , whereby a propulsion is communicated to the balance by an impulse tooth. As already stated, Figs. 1 and 3 indicate such a position.

The wheel escapement takes place in the same manner as by the anchor movement by fork, table roller and ruby pin. Fig. 2 shows the balance, and at m and n , two positions of the wheel tooth are given during driving; the foot of the impulse tooth operates at the commencement (m), then occurs a moment when the fore tooth flank is engaged with the surface c , and at the end of the lifting, at n , only the impulse tooth point operates, as is theoretically correct. The driving proportions consequently are rather uncommon in this escapement, brought about by the small number of escapement teeth (six), each one of which must operate through an angle of 60° , while in a 15-tooth wheel, this angle only measures 24° . Of course, 20° for drop should be deducted from 60° , still leaving 40° for the actual engagement, and this only occurs at each fourth vibration.—F. Rosenkranz, *Allg. Jour. d. Uhrm.*

Business Notes.

W. Trier, of Messrs. Trier Bros., recently returned from Europe with many novelties in their line.

C. M. Larue, a well known watchmaker of considerable ability, has opened a store at Danbury, Conn.

Henry Fera, who is now in Europe buying diamonds, is expected to arrive about Aug. 14, in the steamer *Elbe*.

J. M. Rutherford, of Philadelphia, a well known jewelry auctioneer, has just had a successful sale in Quincy, Pa.

George C. Taylor, of Messrs. Taylor & Bro., is now in Europe in search of novelties in French clocks, fancy goods, etc.

Among the recent departures for Europe we notice the names of P. H. Buckley, of New Orleans, and M. Pollak, of this city.

Mr. Adolph Jelenkiewicz, long and favorably connected with the firm of Gustav Ephraim & Co., has been admitted to partnership.

F. Bing & Co. have recently received an extensive invoice of French clocks, bric-a-brac, etc., that must be seen to be appreciated.

Harris, Spier & Co. offer a full and attractive line of novelties in jewelry, and a large and comprehensive assortment of Swiss watches.

The Seth Thomas Clock Co. have removed their Chicago offices from 172 to 161 State street, where they have always in stock a complete line of their goods.

The co-partnership heretofore existing between A. Friedenthal and his brother, has been dissolved by mutual consent. A. Friedenthal will continue the business.

Messrs. Rogers, Smith & Co. present in this issue of THE CIRCULAR a very elegant design of rare artistic merit, typical of the elegant stock which they have on exhibition.

Mr. Alfred H. Smith, of Alfred H. Smith & Co., who is now in Europe with his family, has sent his firm several parcels of exquisite gems of rare beauty and great value.

E. S. Walrath, manufacturing jeweler of Syracuse, N. Y., was one of the victims of the late fire that recently occurred in that city. His loss is reported at \$2,000, fully insured.

Levy, Dreyfus & Co. have recently received an extensive invoice of opera glasses, of all qualities, including those of the best known makers. Their stock of optical goods is unusually complete.

Barnet Bros. & Powell, of Newark, have moved into very comfortable offices at No. 15 John street, New York, where a complete line of goods of their own manufacture will always be found in stock.

Mr. James Hedges, of the firm of Wm. S. Hedges & Co., has returned from Europe, after a five months' sojourn on the other side. He devoted his entire attention to the selection of diamonds for his firm.

W. S. Hicks, manufacturer of pencils and pencil cases, presents a neat and attractive advertisement on another page of this paper, in which he indicates that he is making pencil cases for other worlds beside ours.

Charles Petersen, of Honesdale, Pa., is temporarily embarrassed in his business, from dull trade, shrinkage of stock, etc. The trade recognizes his honesty of purpose, and his creditors are inclined to deal with him as leniently as possible.

Mr. Isaac A. Ailing, of the late firm of Ailing Bros. & Co., has formed a partnership with Mr. Holmes, of the late firm of Holmes & Hall, and have commenced the manufacturing of jewelry at their factory, corner of Walnut and Mulberry streets, Newark.

Messrs. William S. Hedges & Co. have recently introduced important changes in their offices, by means of which they gain considerable additional room. The offices are fitted up in a neat and artistic manner, and with a view to convenience and comfort.

The Ansonia Clock Company's new building in Brooklyn is being equipped in the most thorough manner, with appliances for extinguishing fire. The company's experience with the "fire fiend" has taught them to protect themselves from further encroachments.

T. S. Tice, of Brooklyn, whose failure occurred a short time since, has effected a compromise with his creditors. Mr. Davidson, an expert accountant, has examined his books, and presents a very satisfactory report of the manner in which they have been kept.

The old firm of Ailing Bros. & Co., has been dissolved by mutual consent, Isaac A. Ailing retiring from the firm. The business will hereafter be conducted by Horace and William R. Ailing, both members of the old firm, who continue at the old address, 170 Broadway.

Messrs. August Saltzman, and Jules Gruet, have returned from Europe, after a brief sojourn on the other side of the water. We are happy to announce that both gentlemen withstood the blandishments of that charming actress, Sarah Bernhardt, who sailed on the steamer with them.

Foreign Notes.

Sir Bartle Frere lately stated that in a single year more than £3,500,000 worth of diamonds have passed through the Cape Town Post Office.

The Swiss Exhibition of watches, watch tools, materials, etc., at Chaux de Fonds, promises to be a great success. Over 450 applicants have applied for space to exhibit their wares.

Queen Victoria's gold and silver plate which is kept at Windsor is said to be worth \$15,000,000. When the Queen entertained the late Czar shortly after the marriage of his daughter to the Duke of Edinburgh, gold plate to the value of \$10,000,000 was used. The custodian of the gold pantry at Windsor is considered an office of great trust.

A number of Liverpool opticians, cordial admirers of Mr. Gladstone, have manufactured for his especial use a masterpiece of their handicraft in the shape of a pair of spectacles. The difficulty of obtaining the Premier's "sight" was overcome by obtaining private information as to the strength of the glasses which Mr. Gladstone has in ordinary use. It may be interesting to know that his sight is classed by these skilled opticians as remarkably young for his time of life.

Diamonds have been discovered in Australia, a few hundred miles from Sydney. They are said to differ materially from those found at the Cape, inasmuch as they are quite round, perfectly smooth on the outside, quite transparent and colorless, and in polishing were found even harder than the Indian or Brazilian stones. Only a few small stones have as yet found their way to the hands of the lapidaries, yet it is confidently believed that a systematic working will develop mines as rich as those in South Africa.

The twelve lockets worn by Lady Brooke's (Miss M. and) bridesmaids at the great wedding at Westminster Abbey the other day, were exceptionally beautiful, being very costly works of art. Each was formed of diamonds and pearls, worked with the greatest skill into the most exquisite representation of the form and petals of a daisy—appropriate emblems of the youth and innocence of the bride and her bridesmaids, as well as a souvenir of herself, the pet name by which she has been known to her family and friends since her birth being Daisy.

There is a new instrument coming into use in England for the purpose of receiving Greenwich time signals at telegraph stations, &c. Hitherto, the passage of the time signal along the lines gave no other indication of its presence than a deflection of the needles of ordinary instruments and a corresponding movement of the armature of the Morse ink-writer, and sounder, at 10 A. M., and the eye had to be kept constantly on the instrument to learn the exact time. In the new instrument there is an arrangement which rings a bell and at once arrests attention when the first part of the time signal is transmitted.

The coral fishing industry is one of the points at issue between France and Italy with regard to the ownership of Tunis. The Italians have monopolized this branch of commerce owing to the Imperial Convention of 1862, which reduced the tax (annual) for Italian coral fishers from 800 to 400 francs. The larger sum is, however, exacted from French fishers, who obtained the right by treaty of the same date. The first Tunisian coral fishers were, we are told, natives of Marseilles, who, as early as 1604, formed a company to work coral. Cutting and polishing manufactories have existed in Marseilles before 1807, for at that date as many as seventeen were found, and many hundred hands were employed in them. Coral has, however, of late years, rather lost favor in France. In Russia the fashion, however, of wearing it has increased, also in the Levant and elsewhere, the Italians supplying these markets, and it is this monopoly that the Algerians and Marseillais wish to break up.

The slow of Mademoiselle Schneider's jewels and household furniture in Paris has been the great event of the gossiping world of fashion and dissipation. A crown of fine workmanship and studded with gems of rare value was included in the exhibition. This was the crown of the Grand Duchess of Gerolstein. A sceptre, also jeweled, kept its company. Rivers of diamonds were a drug at this suggestive exhibition. A necklace, which was part of the Grand Ducal set, formed of forty-one pearls, six brilliants, and five sapphires, went for 68,000 francs. Two black pearls were knocked down for 38,000 francs, an emerald pendant went for 11,000 francs, and the diamond which formed the center of the stars of the Order of Brave Knights at Gerolstein, for 10,000 francs. The total proceeds of the first day's sale exceeded \$43,000. It is Mademoiselle Schneider's intention to end her days in a convent. As her fortune is considerable, she is not obliged by harassing creditors to sell her jewels, which are of astonishing variety and richness.

Trade Gossip.

Turquoises set in Etruscan gold are the fashionable jewels this season.

Charles C. Budor, of Budor Bros., Columbus, Miss., was married June 29 to Miss Josephine Goodwin, of that city.

The factory of William Riker, of Newark, was destroyed by fire recently. The building and stock were fully insured.

Diamonds have been discovered at Seneca City, S. C., but don't all go at once. Editors especially had better stick to their paste.

Louis C. Bernays, of Little Rock, Ark., has offered an elegant gold medal for the best drilled man in the manual of arms in the state of Arkansas.

Many members of the trade are now enjoying their summer vacations at the seaside and in the mountains. We wish them lots of fun, and renewed energy for the coming business season.

Mr. Fahy's new factory in process of erection at Sag Harbor, is progressing as rapidly as can reasonably be expected, and they hope to be in running order, with new and improved machinery, early in the fall.

The advertising sheet which at present has the most vivid conception of the utter superfluity of crediting articles extracted from this Journal, is appropriately called "The Trader," and it is published in Toronto, Canada.

Joe Werne has taken charge of the stock of George Strong, of New Orleans, for the benefit of the creditors. Joe is an old and experienced jeweler, a *bona fide* man, and the person of all others best calculated to get the creditors a good shape.

Some enterprising manufacturer has come out with a line of comets jewelry. Whether it is one of the half dozen recently discovered comets he intends to commemorate, or the comet of the future is not known. He does not commit himself on this point.

The Jewelers' Union rejoices in a membership of 165, and has issued to these members 311 certificates. The good accomplished by the Union in protecting the goods of its members has been recorded in our columns. It is conducted with energy and economy.

H. Terhune & Son, wholesale dealers in clocks, of this city, have failed. The business was established over thirty years, and the firm was one of the leading houses in the jobbing trade. The liabilities are reported at \$26,000, while the actual value of the assets will probably not exceed \$13,000.

Coney Island, Long Branch, Rockaway, and other summer resorts near New York are doing a good thing for the jewelry trade. They serve to induce buyers to come east during the hot weather, and being here they combine business with pleasure. By this means the fall trade has been advanced several weeks.

During the recent heated term in Cincinnati, a report reached us that Mr. Clement Oskamp and Mr. Hellebush, prominent jobbers of that city, had been prostrated by the heat. A response to our inquiry by telegraph announced that the rumor—published both in Cincinnati and New York—was unfounded, and that both gentlemen were in good health.

Our gallant friend, George H. Ford, of the military staff of the Governor of Connecticut, goldsmith, jeweler and silversmith, of New Haven, has issued to his friends a little *brochure*, commemorative of the fiftieth anniversary of the foundation of his house. Mr. Ford has been eminently successful in business, and has earned a favorable reputation throughout the trade.

The regulation straw hats provided by the New York Jewelers' Club for its members on the occasion of their recent visit to Providence, were not only very graceful, but very appropriate for the season. The distribution of them, however, seems to have been unfortunate, as all the big-headed fellows got hold of the smallest hats, and the little-headed fellows were at sea in hats much too large for them.

It is estimated that there are over 6,000 alleged patents for flop-over cuff buttons in the market. Each manufacturer claims that his is the best, and, what is more, he proves it beyond contradiction. Large numbers are being sold, in every variety of style. The Acme Lever and the American Lever are the most popular, however, and no well appointed jewelry store can afford to be without them.

An act for controlling gold and silver goods, published in full elsewhere, has been passed by the Federal Council of Switzerland. The standards adopted are: For gold, 18 karat, stamp, Helvetia; for gold, 14 karat, stamp, head of a chamois; for silver, 0.875 fine, stamp, a squirrel; for silver, 0.800 fine, a woodcock. The stamping is compulsory for watch cases, but voluntary for jewelry and silverware.

Not the least attractive feature of the jewelry trade in these days is the fancy boxes in which jewelry is encased. They are made in many beautiful forms and styles, and many of them are really works of art, combining every variety of wood with exquisite trimmings in silk, satin, etc. These beautiful boxes contribute largely to the attractiveness of the goods displayed in them, and frequently complete a sale.

It is a well-known fact that this country absorbs more diamonds than any other, and that the finest gems that come from the hands of the lapidaries are in greatest demand here. The demand, in fact, for rare gems is so great that it cannot be supplied, and fabulous prices are being paid for them. Many wealthy persons regard diamonds as the best class of securities in which they invest their money. They pay no interest, certainly, but neither do they suffer from depreciation.

There are many pieces of lacquer ware, richly designed and elaborately finished. A lovely jewelry cabinet shows a handsome finish in gold dust on the inside. The decorations comprise various blossoms—there is the pomegranate, hyacinth, and striped anemone. A pretty flower support made of a bamboo frame has much to be admired; the top is of gilt wire forming a railing, and here are placed pressed ferns, grasses, and autumn leaves; in the center of the stand is a bowl filled with fresh flowers.

During the month of July there was quite an army of jobbers in the city, visiting the manufacturers and making their fall purchases. They have been generally followed up and down Maiden Lane by a lot of peripatetic peddlers from Providence, with sample boxes, seeking to induce them to look over their samples, until in sheer desperation the pursued buyers rush into the office of some friendly dealer, where their pursuers seldom dare to venture. The Astor House, headquarters for those Providence houses that have sufficient liberality to hire rooms for their sample salesmen, has presented quite an animated scene of late.

On September 2 the National Exhibition of Art and Industry will be opened at Cincinnati, being the ninth of this series of industrial exhibitions inaugurated by Cincinnatians. Heretofore they have been attended by marked success, and special efforts are being made this year to excel all previous exhibitions. Mr. K. H. Galbreath, of the well known jewelry firm of Dubme & Co., of Cincinnati, is President of the association, and is also Chairman of the Committee on Fine Arts. In the Board of Commissioners he represents the Board of Trade of Cincinnati. Mr. Galbreath is one of the most enterprising and public spirited citizens of Cincinnati, and is putting forth every energy to make this exhibition the most complete of its kind ever held in any city. The trade is invited to exhibit jewelry, silverware, bronzes, and ornamental goods peculiar to their art.

For the first time in nineteen years the sewer which drains the Mint in Philadelphia, has been cleaned for the purpose of securing the particles of gold and silver which are carried from the coining rooms, through the smoke-stack to the roof and down the rain spouts into the drain. This sewer empties into the main sewer on Market street, and is provided with two ponderous stone traps, to prevent over-venturesome thieves gaining an entrance into the coining house by way of the sluiceway. When it was in readiness the contents of the sewer were brought to the surface in boxes, and were then dried, run through rollers, and the precious metal recovered by means of mercury. It required two days and one night to clean the culvert, which resulted in the recovery of metal to the value of \$143.85. When the drain was cleaned nineteen years ago, gold and silver to the value of \$21,000 was recovered.

Great care is taken in the shops of our jewelers where articles are manufactured of gold, to prevent the waste of the precious metal. Every scrap of filing, scraping, or grinding is preserved for the assayer. The buff wheels on which gold or silver is polished, when they are worn out, are burned, and the fire soon develops fine particles of the precious metals that cannot be seen with the naked eye. Even the sweepings of the shops are kept, and are worth about \$70 a barrel when the most scrupulous care has been taken to prevent stray pieces getting into it. Sometimes assayers will buy the sweepings of a shop at a given price per barrel, taking the risk of what they will yield. Whenever a shop floor is to be taken up and renewed, it is always calculated that the dirt accumulated in the crevices will more than pay the cost of the new floor. Jewelers say that the value of the shop dirt is owing to the dust of gold that is blown about the place, and not from any carelessness of workmen. Even after the assayers have got through the loss on jewelers' stock is generally about two per cent. This includes whatever may be taken, if anything, by dishonest workmen.

THE

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THE

JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

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The Mission of the State Associations.

THE several State associations of retail dealers, organized to protect themselves from the unbusiness-like practices indulged in by a few jobbers, have, unquestionably, effected considerable good. The practice of scattering catalogues and price lists promiscuously throughout the country by the jobbers has been virtually abandoned, and there is less complaint of their selling goods to persons not in the trade at wholesale prices, thus engendering an unexpected competition with the retailers. Our sympathy has uniformly been with the retailers in their struggle to overcome these unbusiness-like practices, and we have lost no opportunity to encourage them in their good work. These associations have, however, adopted one measure of warfare that we cannot approve, and which opens the door to such abuses that it cannot be too speedily abandoned. This is the circulation of what they term a "black list." This is a list comprising the names of such jobbers as circulate catalogues and price lists, or sell goods to persons not in the trade to sell again. While these practices are in violation of the general comity of commerce, which is supposed to protect retailers from unwarranted competition, yet they are not unlawful. A jobber may lawfully sell goods to dry goods dealers, hardware merchants, clothiers, or anyone he pleases, and give him precisely the same advantages in trade prices that he will give to a retail jeweler, without violating any law whatever. To publish his name in a black list for so doing, and warn retail dealers not to patronize him, is a violation of law and a punishable offence. It partakes of the nature of a conspiracy to injure the business of such person, and the courts have repeatedly punished persons guilty of attempts to injure the business of another. We believe that every member of any association that has published a black list, is liable in damages to the persons so proscribed, as well as a criminal prosecution for conspiracy. Being confident of the illegality of the pro-

ceeding, we cannot but warn the associations that such publications should be abandoned, otherwise respectable dealers will refuse to become members of their organizations. There is too much good, honorable work for these associations to do to warrant them in taking the risk of losing their membership by persisting in an unlawful practice.

But aside from the unlawful nature of the black list, it is liable to be the means of perpetrating great injustice and to be grossly abused by designing persons. If, for example, a jobber refuses credit to a retail dealer, that dealer has it in his power to go before his association, denounce the jobber for illegitimate practices, and have him published in the black list. Not only is this possible, but, we are assured, it has actually been done. Jobbers cannot always know the exact business standing of the persons to whom they sell goods, and a stationer or fancy-goods dealer in some interior town is not unfrequently a more liberal buyer than the local retail dealer, who lacks the enterprise and the credit to control the local trade. A jobber selling to such stationer or fancy goods dealer, would be liable to be denounced by the unworthy retailer, and find his name published in the black list, and the trade warned not to have dealings with him. The association might investigate the charges made, but would scarcely discover the fact that the retail dealer had proven to be unworthy of credit, while the fact that the jobber had sold to an outsider would be established. In such a case a great injustice would be done the jobber; indeed, we are assured that such wrongs have been committed already. The CIRCULAR has been too earnest an advocate of the rights of retail dealers to be suspected of taking the other course when it advises that the black-list plan opens the door to greater abuses than the retailers themselves complain of, and is, also, unlawful. The remedy, in fact, is worse than the disease. Jobbers have long felt the injustice of it, but have patiently waited for the evil to cure itself. These state organizations no longer need to resort to unlawful means to accomplish their ends. Their membership is large, their influence, consequently, is all-powerful; their grievances have been made known, and their platform of principles widely announced. There is little danger that the objectionable practices they complain of will be renewed, hence the necessity for retaliatory measures has passed away. Let the black list be relegated to the past, as the unwarranted circulation of price lists and catalogues has been. We are convinced that jobbers generally desire to maintain the most harmonious relations with the retailers, and will not wittingly transcend the customs of the trade. They must be permitted, however, some latitude in their sales, and to judge for themselves as to whom they will accept as customers within the limits prescribed by the unwritten laws of trade. Jobbers of respectability are not going about drumming for trade among hardware merchants, druggists, clothiers, etc., to the prejudice of their trade with local dealers, unless there is good reason for it. If the outside dealers sell more goods and are more deserving of credit, they are very sure to get the goods they desire from some source. When such outsiders build up a good trade in jewelry, it may be taken for granted that the local dealer does not enjoy the confidence of the community in which he lives. There will always be individual complaints against jobbers, however, but they are not to be judged by isolated cases, and condemned unheard; on the contrary, their regular practice

should be the standard of criticism, and what constitutes their custom only subjected to approval or condemnation.

But the minor abuses complained of by the state associations have been virtually overcome, and a better feeling established between the dealers and the jobbers. Criminals and recriminations should now be abandoned, and everything possible done to preserve harmony between them in the future. The great work that these associations can do remains to be done, and in the doing of it the dealers will have the hearty sympathy of the better class of jobbers. This work is, as we have before intimated, driving out of the business the sharpers and swindlers who deceive the public in the quality of the goods they manufacture. The deterioration of quality has done more to bring the trade into disrepute than all the unbusiness-like practices of the jobbers. When 10-karat goods are deliberately palmed off as 14 karats fine; when filled rings are sold for solid gold; when watch cases are loaded with steel springs and brass filling, and sold by their weight as gold; and when 12-karat chains bear a 14-karat swivel, and the whole sold as 14-karat gold, a deliberate fraud is perpetrated upon the public, and all persons having a knowledge of the true character of such goods and still aiding their sale, are *particeps criminis*. It make no difference in the character of the offence that the goods are sold for a less price than they would be if they were genuine; the deception is the same, and the profits realized by such deception are the wages of criminal transactions. Retail dealers are by no means innocent in many of these transactions. They say to jobbers, "we want goods that we can sell cheap, and still make a profit on; they must have the appearance of genuine goods or they won't sell." The jobber turns the order over to the manufacturer, and goods of an inferior quality are turned out bearing the stamp of a higher grade. The manufacturer is the least culpable of all; he makes what is demanded and gets pay for the goods as they are, while the jobber and the dealer divide between them the difference between the actual value of the goods and the value as represented. It is certain that manufacturers would not make debased goods unless there was a demand for them, nor would jobbers handle them. As the matter stands, manufacturer, jobber, and dealer are in a conspiracy to defraud, and the patient public is the plundered victim. It is in the power of the state associations to put an end to these frauds. Let them demand that the quality of all goods they handle shall be precisely as represented, and refuse to handle any that are not up to standard. These organizations embrace in their membership large numbers of retail dealers, sufficient to give force and impetus to a demand for reform in the quality of goods, and the abandonment of the swindling practices heretofore indulged in. Let them set the ball in motion, and, by concerted action, put themselves before the public in the attitude of honest men protesting against dishonest acts. If they will refuse to handle debased goods, such goods will not be made. There is profit enough legitimately in the business without robbing the public by filching gold from the goods they want, and supplying its place with base metal. The dealers have proclaimed the evil practices jobbers have been guilty of; now let them put a little more conscience into their end of the business and cease to make a market for debased goods. Here is a field in which the state organizations can be made useful, and show that they have a good purpose to serve.

Running the Gauntlet.

THE CIRCULAR has several times alluded to the annoyances to which buyers who visit this city to make purchases are subjected by a class of cheap salesmen, representing out-of-town manufacturers. The manufacturers either have not the standing or are too niggardly to secure offices for the transaction of their business in this city, and so they employ cheap and impudent salesmen, who take rooms at the Astor House, and lie in wait in its corridors and on the sidewalks to ambush their victims. They invariably have a sample box in hand, and the amount of "cheek" they

display in forcing themselves upon the attention of buyers would do credit to a highwayman. These "cheap John" drummers are known as "the celluloid cuff brigade," from the fact that they employ celluloid instead of linen cuffs, as a matter of economy in wash bills. These celluloid young men have rendered the Astor House a place to avoid by buyers who desire peace and quiet. They know no business hours, but force themselves upon the attention of buyers from the country at all times and at all hours. Sample box in hand, they corral them in the halls, while on their way to the dining room, and, seizing them by the buttonhole, insist upon displaying their samples. It makes no difference to them that the jobber may be in attendance upon his wife and daughters, or in company with lady friends, they boldly rush forward and present their cards, demanding that their victim shall leave his companions and inspect the contents of their sample boxes. They send their cards to the rooms of buyers at all hours of the day and night, insisting upon an interview, and if this is denied, they lie in wait in the halls till their man shall emerge from his room. They contrive to find out the engagements made by the buyer, and whether he goes riding, to the theatre in the evening, or to some of the watering places near by, he is sure to encounter some of these celluloid cuff young men on his way. It is reported and vouched for that one buyer, who contemplated leaving the hotel by an early train, on emerging from his room at six o'clock in the morning, found four Providence drummers fast asleep at the threshold of his door, each clasping a sample box in his hand. Three of these persistent salesmen are reported to have followed to Coney Island a gentleman from the west, who, they thought, was about to elude them, and importuned him even while he was bathing in the surf.

The Astor House has always been a favorite resort for buyers, because of its nearness to the principal jewelry houses in the trade, but the annoyance given them by these sample salesmen of cheap goods has driven many of them to seek quarters in other hotels during their visits to the city. There is a large, powerful porter employed at the Astor House; it would pay the proprietors to arm him with a large club and instruct him to use it freely upon every person found in the building offering goods for sale. Respectable guests are entitled to some protection from the importunities of book agents, lightning-rod men, and even the salesmen of cheap jewelry.

But there are other evils resulting from the pertinacity of these persons. Buyers find them so troublesome that they are frequently obliged, in self defence, to treat them discourteously, and not infrequently to launch imprecations upon their heads. It has made buyers suspicious of everybody, so our respectable local dealers are almost afraid to greet on old customer in the street, lest they should be mistaken for sample salesmen and treated discourteously. This has had a tendency to cause the local dealers to refrain from extending to out-of-town buyers those courtesies they would be glad to do but for the fear that their motives will be misconstrued. Hence, buyers sometimes think these New York dealers are a cold-blooded set, who cannot appreciate the civilities of business intercourse, and only see their customers from a dollar and cent point of view. Then there are buyers who, seeing how greedily these box men seek their custom, become inflated with their own importance, and assume arrogant airs that are offensive, not realizing that there is a vast difference between men of respectability and standing in the trade, and these peripatetic curbstone drummers. If such buyers are not treated with the same cringing servility by the respectable dealers, they feel offended, and think the dealer is "putting on airs." It is unfortunate for the trade, both buyers and sellers, that this objectionable feature of sample selling should have been fastened upon it. There is a legitimate field for commercial travelers, who visit dealers at their home places of business, and give them opportunities for buying the latest styles of goods without involving an expensive eastern trip. But this practice of waylaying buyers when they have come east to purchase, is reprehensible from every point of view. It is safe to look upon every man with a sample box, who makes a business of importuning buyers in the streets or the hotels, with suspicion, and

any courtesies offered by such men should be promptly rejected, and their importunities firmly and forcibly put aside. This practice has been carried to such an excess that it has become an intolerable nuisance. Those manufacturers who employ these curbstone salesmen will consult their own interests by withdrawing them, or establishing them in offices of their own, where they can prosecute their business in a legitimate manner.

In this connection a word of caution to some of our local dealers will not be amiss. There are a few whose manner of accosting probable buyers in the street or in the office, is altogether too effusive; they overwhelm their friend with invitations to drink, or to take lunch, crowd cigars upon him till his pockets bulge with them; they are obsequious and fawning in their manner to a degree that is almost an insult to the person addressed, leading him to believe that he is regarded as a person lacking in good sense and discrimination. All this is done in the hope that, in return for such consideration, the visitor will buy a few dollars' worth of goods. Such subservient solicitation is beneath the dignity of a respectable house, and tends to bring the trade into disrepute. Buyers are thus made to think that New York dealers are so anxious to sell goods that they are willing to pay a premium for orders. No wonder they not infrequently take advantage of this overweening desire to get rid of goods, and push their credit beyond legitimate grounds. Nor is it surprising, when goods are thus forced upon buyers beyond their requirements, that the jewelry trade is called upon to compromise with delinquent debtors more frequently than any other, and to accept smaller percentages in liquidation of their claims. The over-anxiety of dealers to crowd their goods upon purchasers is responsible for many of the disasters that overtake them. A calling so honorable as that of the jeweler should be prosecuted in a dignified and respectable manner, by persons of intelligence and good business standing, and not by the impertinent pertinacity that is characteristic of Chatham street.

Roll-Plate Goods.

WE have received numerous inquiries of late from dealers throughout the country who are desirous of knowing why it is that they do not get as good a quality of rolled-plate goods as formerly. Several causes combined have had a tendency of late years to induce manufacturers to make an inferior quality of rolled-plate goods. The principal one is the largely increased demand for cheap goods coming from outside dealers. Dry goods merchants have added to their stocks lines of cheap jewelry, consisting of sleeve buttons, scarf pins, ladies' bracelets, pins, etc., while gents' furnishing-goods dealers now carry full lines of gentlemen's jewelry of the cheaper sort. This is mostly rolled-plate goods, and these outside dealers have been constantly clamorous for cheaper goods. Quality possesses no merit in their eyes—they want cheap goods that are attractive and will sell readily. Not being regularly in the trade, they do not fear after-consequences for no one ever thinks of returning cheap goods bought at a cheap place because they are cheap. A regular dealer, however, must face the consequences if he sells goods that do not give satisfaction. To meet this outside demand for cheap goods, manufacturers have been obliged to reduce the quality, and, as a consequence, much of the rolled-plate goods to be found in the market are far inferior to those made a few years ago. The plate put upon the base metal is not so thick as formerly, while the gold embraced in it is not of so fine a quality. Eight and ten karat plate has taken the place of fourteen and sixteen karat, while the plate has lost its thickness and is but the semblance of what it formerly was. These goods look well when new and fresh, but they will not wear with any satisfaction. Rolled-plate goods of the old sort were good for ten or twelve years' wear, but the modern plate will scarcely wear a year, and, beside, is clumsily made. There are some manufacturers of rolled plate who still maintain the old standard, and whose goods are as meritorious to-day as ever, but there are many others who have so debased their products that they scarcely possess a symptom of gold.

The remedy for this lies in patronizing only those manufacturers of rolled-plate goods who make a good article, and who do not seek the orders of outside dealers, but confine their sales strictly within the trade. There are many manufacturers who do this, and such men are entitled to the confidence of the trade. They make cheap goods, to be sure, but they sell them for just what they are, and to meet a legitimate demand. A still better way to meet the remedy complained of is to educate the people to an appreciation of the better grades of goods; to teach them the difference between cheap and flashy jewelry and goods possessing intrinsic value combined with beauty of design and elegance of workmanship. Fortunately, the people are rapidly acquiring this knowledge, and the demand for the better grades of goods has never been so great as now. But there will always be a demand for rolled-plate goods, and it is unfortunate that a certain class of manufacturers are so debasing the quality of them as to bring them into discredit. Some of the rolled-plate jewelry now in the market is little better than fire gilt, and will tarnish almost as quickly. Legitimate dealers in the trade should refuse to buy such goods, but should leave their sale exclusively to the dealers in furnishing goods and Yankee notions. In France, the law will not permit imitation goods to be sold in the same shop where genuine goods are kept. It is not possible to apply such a law to the trade in this country, but retailers themselves should draw a broad line of demarcation between jewelry proper and the "cheap and nasty" stuff that is sold by dry-goods merchants, fancy-goods dealers and curbstone vendors. There is a distinction between the goods broad enough for anyone to see, and they will find it to their interest in the end to refuse to be identified with the latter class. The trade in rolled-plate goods is legitimate, for there is a legitimate demand for them; but the traffic in "skin" goods will not be countenanced by dealers of respectability.

The "Perquisites" of Dealers.

IN another column we print a communication signed "H. J. P.," about what the writer claims are "perquisites" of dealers. Although the writer failed to comply with our requirements to furnish his real name and address, we violate our rule for this occasion and publish his letter because of its exceeding freshness. There is a charm always in the confession of a thief, and this one, who deliberately declares that he believes swindling to be legitimate, is peculiarly refreshing in this hot weather. He takes us to task for having denounced the manufacture and sale of goods of bogus quality, and claims that 10-karat goods are just as good as 18-karat, so long as the purchaser don't know the difference, and justifies the sale of the debased article for the better quality. In other words, he says that obtaining money by misrepresentation and by fraud is legitimate. When our correspondent says that it is the custom of dealers to misrepresent their goods, and to swindle the public, we conclude that his knowledge of the trade is limited to a few dealers of his own class, who are ready to resort to any kind of trickery to make a dollar. Such practices do not prevail among respectable dealers, and the class that does resort to them bears about the same proportion to the whole trade as the number of pickpockets does to the entire population of the country. Our correspondent relates, with evident relish, a trick his son played on a customer. The son is evidently worthy of his sire, and if his education is continued in the same manner, in a few years he will be a candidate for state prison. The trouble with our correspondent is that he has no moral perceptions, and probably the only thing that prevents his being a burglar or a bank robber is that he is too much of a coward; it is not the crime he fears because it is a crime, but detection and punishment.

"H. J. P." says that his profits lie in selling bogus goods for genuine; representing 10-karat goods to be 18 karats, and selling watch cases for all gold when he knows that a large steel spring constitutes a good proportion of their weight. The difference between the actual and the represented value of the article he calls "perquisites."

Suppose our correspondent buys a tub of butter at his grocer's, paying cash for first quality; on opening it, he discovers a ten-pound stone in the middle; does he consider that stone a legitimate "perquisite" of the manufacturer and grocer, or does he raise a row, call the police and claim that he has been robbed? We venture to say that the jeweler who makes the most "perquisites" in selling his goods would be the loudest to denounce such a swindle on the part of his grocer. Yet where is the difference between selling 10-karat goods for 18 karats and stones for butter, sand for sugar and water and chalk for milk? A steel spring in a watch is no more gold than the stone in the tub of butter—it is not even oleomargarine. In the case of fraudulent sales of groceries, there is a law to punish the offender; but in the case of the seller of base metal for gold, detection is so difficult that punishment is unknown. Yet the law makes the one a criminal offence quite as much as the other, and he who sells jewelry by misrepresentation and fraud is quite as amenable to the law as any other swindler. In the difficulty of proving the offence lies their immunity. Whether dealers will engage in such transactions or not, therefore, becomes more a matter of conscience than of law. If they have no moral perceptions, and are unable to distinguish between honesty and robbery, they will imitate "H. J. P.," and resort to every trickery, falsehood and deceit that they deem necessary to obtain the money of their customers. Fortunately for the trade, the number of dealers whose moral perceptions are so obtuse is comparatively small. In the respectability and integrity of a large majority in the trade lies the safety of the public. If all dealers were as unprincipled as our correspondent confesses himself to be, how long would it be before the honorable calling of the jewelers would be on a level with that of a pawnbroker, the gift enterprise business, mock auctions, and other recognized swindling concerns? It is probable that a few such patrons of *THE CIRCULAR* as "H. J. P." will "stop their paper," but this will not "stop *THE CIRCULAR*," nor prevent it from denouncing fraud or seeking to drive out of the business those unprincipled men who use it as a cloak to cover their rascalities, and who would be declared thieves but for their fear of the law. We are gratified to know that our course in denouncing these illegitimate practices is heartily endorsed by the responsible members of the trade, from whom we have received many commendatory letters. "H. J. P.," and all who sympathize with him, are earnestly requested to withdraw their patronage from *THE CIRCULAR* at once; we have no desire to share in any way the plunder such persons derive from the public.

Standards of Time.

THE question of a uniform standard of time for commercial and scientific purposes has long enlisted the close attention of many of the most prominent of our citizens, the scientists—especially the astronomers—business men and others. This has of late reached a more important point because of the attention paid to it by the American Metrological Society, of which the head of Columbia College—Professor Barnard—is president. The difference in time between points only comparatively a short distance separated makes a very great difference in business affairs, as, for instance, those seeking connection with railroad trains, steamboats, banks, etc. The New York Central Railroad, to illustrate, runs on New York time, and the Buffalo people are compelled to submit; and yet it means a difference of twenty minutes of time. The Pennsylvania runs trains out as far as Pittsburg, etc., on Philadelphia time. So important has this matter of a difference in time between various points become that the Legislature of Connecticut recently declared that all railroads in the state should run on New York time.

"Local time," in the astronomical sense, varies with every change of meridian; it therefore cannot conveniently be retained by travelers and transportation and telegraph companies, which adopt whatever meridian may be the

most convenient. Over seventy such standard meridians are now in use by transportation companies in the United States and Canada; and the larger cities and towns frequently adopt their own special local times, and the smaller ones adopt the railroad times most convenient, so that there are now in use one hundred local times or meridians, many of them differing but a few minutes from each other.

For a continental triangle it is proposed to have five fixed meridians, one hour apart in longitude, and every place on the continent or its neighboring islands shall regulate its time to be identical with that of the nearest meridian. The result will be that all timepieces throughout the continent will show the same minute everywhere, but at points widely from each other, east and west, they will differ as to the hour. The manner in which the hour will differ is hereby shown.

Prof. Barnard recommends the adoption of five sectional standards for the American continent. The standard meridians we would use are those of 60, 75, 90, 105 and 120 degrees west of Greenwich. The time of the first named would be known as "Eastern time," and would be the standard in Newfoundland, Nova Scotia and New Brunswick. The next would be "Atlantic time," current from Maine to Florida. Then would come "Valley time," for the center of the continent. "Mountain time" for the Rocky Mountain region, and last "Pacific time," for the Pacific states and British Columbia. Each of these standards would be exactly one hour later than the one immediately to the east, and the first would be just four hours later than Greenwich time. The central meridian of 90 degrees, which passes through the Mississippi Valley, which might be regarded as the standard time of the United States, would be just six hours later than Greenwich time. This change would be to the advantage daily of the community in all business transactions, and would immensely facilitate the study of certain natural phenomena, such as tornadoes, auroras, earthquakes, meteors, etc., for the observation of which we must depend largely upon those who chance to be favorably located.

If the different railroads throughout the country should adopt this system, a universal time table could easily be formed which would leave the traveler in no uncertainty as to the connection of trains anywhere. We therefore are appealing to railroad corporations throughout the country to give this scheme a careful examination, and we have great hope that they may be induced to adopt it. We also hope to interest other nations in this same improvement, and with this view the American Metrological Society and the Canadian Institute have, during the past year, been forwarding to the principal scientific associations of England and continental Europe, documents recommending the extension of the system of one-hour meridians around the world.

Lord Lorne, the Governor General of Canada, has personally interested himself in the subject, and it is owing to his kind co-operation that our documents have been forwarded, as stated, through the British Foreign Office at London. We have just received the first response from abroad in the form of a report on the subject made to the Imperial Academy of Sciences at St. Petersburg by the eminent astronomer, Professor Otto Struve, which strongly approves the system and recommends its adoption.

Its general adoption would require, of course, twenty-four one-hour meridians to be fixed for the world. As for our continent, we require five only. Among these twenty-four one must be fixed on as a first meridian, and it has seemed to us that the most convenient meridian to be adopted for the zero would be that which is just 186 degrees, or twelve hours, from Greenwich, a meridian which passes chiefly through the Pacific Ocean, touching no land except a point of Kamtschatka, nearly uninhabitable.

For certain scientific or chronological purposes it is proposed to employ the time of this zero meridian universally under the name of "cosmopolitan time." Observations in astronomy or metrology in distant parts of the world should be referred to cosmopolitan time, so that there could be no positive error as to their exact moment of occurrences, such as is sometimes found to occur from the uncertain-

ties of local time. For all the ordinary purposes of life the time would be referred by all peoples to the particular meridian out of the twenty-four nearest to them. Thus, all timpieces throughout the world would show the same minute constantly and differ only in the hour.

We propose also to discard the division of the day into two halves of twelve hours each, as at present, but let the numbering run on from one to twenty four, as it does now in some of the cities of Italy. The division is unnecessary, and is often a source of confusion in time tables, to avoid which some of the European railroad guides print the hours of the night in white figures on a black ground.

We can hardly expect the adoption of these improvements to take place within a brief period, but we feel confident that sooner or later their value, and even their necessity, will be felt.

The Chief Signal Officer of the War Department, General W. B. Hazen, has announced to Professor Barnard that it seems eminently proper that the Signal Service should, so far as practicable, contribute toward the public dissemination of "standard time" for "the benefit of commerce and other interests." He points out that the Signal Office has for several years co-operated with the Observatory of Harvard College in the maintenance of a public "time ball" and says that he is ready to communicate with any other community that may desire it, provided there be already a Signal Service station at such place. General Hazen, after giving the details of the proposed co-operation in the matter of expense, a part of which must be borne not by the government but by the local sections to be benefited, gives the following list of station at which the Signal Service can at present maintain time balls:

Albany, N. Y.; Atlantic City, N. J.; Augusta, Ga.; Baltimore, Md.; Barnegat, N. J.; Bismark, Dak. Ty.; Boston, Mass.; Buffalo, N. Y.; Cairo, Ill.; Cape Henry, Va.; Cape Hatteras, N. C.; Charleston, S. C.; Chicago, Ill.; Cincinnati, O.; Delaware Breakwater, Del.; Denison, Texas; Des Moines, Iowa; Detroit, Mich.; Eastport, Me.; East Shoreham (Block Island), R. I.; Erie, Pa.; Galveston, Texas; Indianapolis, Ind.; Kitty Hawk, N. C.; Leavenworth, Kansas; La Mesilla, New Mexico; Louisville, Ky.; Memphis, Tenn.; Milwaukee, Wis.; Mobile, Ala.; Nashville, Tenn.; New London, Conn.; New Orleans, La.; New York, N. Y.; Norfolk, Va.; Omaha, Neb.; Oswego, N. Y.; Philadelphia, Pa.; Port Huron, Mich.; Portland, Me.; Rochester, N. Y.; San Antonio, Texas; Sandusky, Ohio; Sandy Hook, N. J.; San Francisco, Cal.; Santa Fe, New Mexico; Savannah, Ga.; Smithville, N. C.; St. Louis, Mo.; St. Paul, Minn.; Toledo, Ohio; Washington, D. C.; Wilmington, N. C.

A few of these stations—New York, for instance—already maintain these time balls.

Pneumatic Clocks.

ALTHOUGH the elasticity of atmospheric air has been known for centuries, it would seem that it is only in comparatively recent times that advantage has been taken of that property in utilizing air-pressure for practical ends. The use of compressed air for numerous purposes, from the driving of heavy machinery to the transmission of delicate signals, has, however, of late become very general, and the latest application with which we have been made familiar is that of distributing time to a system of clocks from a central or principal time-keeper. The first attempts to transmit the time by means of compressed air were made in 1864 by Messrs. Popp and Resch, two Austrian Engineers, who however, were then unsuccessful. After a further investigation of the subject and many disappointments they were enabled, on the 23d of February, 1877 to inaugurate in Vienna the first public service of the pneumatic distribution of time, although at their own expense. In the following year the inventors exhibited their system at the Paris Exhibition, where it attracted considerable attention, a silver medal being awarded them for it.

The manifest utility of the system induced the municipal author-

ities of Paris in November of the same year to grant permission to Mr. Popp to lay down pipes in the sewers of the first, second, and ninth arrondissements of that city for the pneumatic distribution of time, and in a month later he obtained authority to distribute time in private houses. The Compagnie Générale des Horloges Pneumatiques was formed shortly afterward, and on the 15th of March, 1880, the inauguration of the system for public service took place. Six miles of pipes had been laid down, and four clocks, some having multiple dials, mounted on lamp-posts on the boulevards, received pneumatic time from the central works. These clocks have continued to work satisfactorily, and have become an established institution. Since that time the system has been further extended, and at present there are about 16 miles of main pipes laid in the sewers, and upward of 500 houses, in which there are over 2,000 pneumatic clocks, are receiving time from the central works, with which they are connected by air-tubes. The public clocks have increased from 4 to 14, with 33 dials among them, in the arrondissements already alluded to, while on the 19th, the Paris Municipal Council granted the company an exclusive concession for 50 years for supplying the time to that city by means of pneumatic clocks, both for public and private use. The system is now being introduced into several large towns in France and other Continental cities. It is also being introduced into England.

The system consists of central works, at which the air is compressed by means of steam engines working air-compressors, and stored in reservoirs at pressures varying from 15 pounds to 45 pounds per square inch. The air thus compressed and stored is led to distributing receivers, passing on its way to each through a pressure regulator, by means of which a periodical transfer or discharge of compressed air from the reservoir into the receivers takes place, replacing the air which is discharged every minute from the receivers to the clocks. By means of the regulator the compressed air in the receivers is maintained at a constant pressure, at which pressure it is delivered to a main or normal clock, by which the system of pneumatic clocks is actuated and controlled. This normal clock is an instrument of great precision, and is fitted with an equilibrium or balanced slide valve, which is successively opened and shut by the action of the clock, which is self-winding. The compressed air is admitted to this clock in a continuous current; but, by means of its mechanism, it is transmitted through small branch tubes to the receiving time-keepers in pulsations.

The hands of the main clock travel in the same manner as those of an ordinary clock. The intermittent current of air on reaching the receiving clocks, which are those in the streets or houses, acts upon their mechanism, transmitting the time to one and all at the same instant. These clocks are made as simple as possible, having an ordinary minute-wheel and a wheel of 60 teeth controlled by a catch fixed on a lever which receives its motion from a leather bellows. Another catch prevents the wheel returning upon itself when once it has been moved one tooth. The pressure conveyed through the system of pipes every minute from the main clock causes the bellows of each receiving clock to expand, thus advancing the wheel one tooth and the minute-hand through a one-minute space. The main air-pipes, which are laid in the sewers, are only about an inch in diameter, and these are tapped at intervals to meet the requirements of the customers. From the mains the air is led through branch pipes about $\frac{1}{4}$ inch in diameter in the buildings and distributed to the clocks in various apartments by means of pipes $\frac{1}{8}$ inch in diameter. The clocks are supplied by the company, a small annual charge being made for their use. The air can be shut off at any time from the house by means of a cock which is placed on the service-pipe at its junction with the main pipe. Leakages in the pipes have no influence upon the general working of the system which has been brought to great perfection by the Compagnie Générale des Horloges Pneumatiques. The whole matter, in fact, appears to be so simple, its action so certain, and its cost to the public so moderate that, other things being equal, we look for its adoption in our midst at no distant period.

The Demand for the Antique.

"We do considerable trade in June and July," said a dealer. "People often come in from the watering places to get the first chance at any good things we may have discovered at the May auctions. It takes us some time to patch them up to suit the market. Yes, there is always a certain demand for these worn-eaten but pathetic relics of the infancy of the republic. We sell to many nice people, who have a taste for the ancient and honorable in furniture, and then we have another class who buy freely and pay high prices. I refer to the newly rich. During the past ten years many of them have taken a kind of dislike to the word 'shoddy'; they have found out what it means, you see. As a consequence there arises a regard for the 'old antique,' as they call it, which increases our sales and raises our profits on everything classical and rickety in the way of furniture and decoratives. Folks that cannot show a long line of ancestors make up for it by good collections of not strictly reliable tables and chairs."

"Is it in men or women that this mania predominates?"

"Women. Men get the fever second-handed like, from their wives. We have to be wide awake in selling, for we can't make sales without asking high prices. Some months ago a hostler came in with an old rag of a rug to sell. It was large, but an ugly, queer, faded-looking thing, evidently a worn-out imitation of those Persian or Turkish mats which look as though they had been dragged through some retail shop. I gave the man a dollar for the article, and my porter gave it a half hour's experience with a club. Then I cut a long breadth out of the threadbare centre, squared up the ends, and put a carpet sewer to stitching the pieces together, adding of course a heavy black fringe. Within a week two ladies called, and being of the new artistic school, they, of course, picked out the mat—the ugliest thing in the shop. How tender in color," said one, and she about hit it. It was tender in other respects, too, if she had only known the fact. 'A precious relic indeed,' said the other; 'Is it Moslem, sir?' 'Pure Moslem, ma'am,' said I; 'all wool—comes from the Adams family.' 'What is the price?' she asked. Now I'm an old dealer, but I hesitated for fear I should not ask enough to impress her. She took my confusion for a reluctance to sell, and from that moment her mind was made up. She took a careless turn around the room, by that time my mind was made up, too. No, no; I wouldn't be willing to state the figure we settled on. It was private rates."

"Do you sell many of these old things?"

"The sales are not very large, but the profits are quite fair, quite fair. Antique furniture is our main hold; it sells right along. It is hard to keep up a really good stock. Here is a fine old set—all mahogany. I had to pick that up piece by piece, and some of it was pretty well smashed up. You see, it is finished in a peculiar style; all the table and chair legs are mounted on a lion's claw holding a brass ball—handrails to match. It's very rare and valuable—worth \$1,600, some call them Hancock's."

"After the General, of course—so solid and heavy?"

"Oh, bless you, no. After old John Hancock, Governor of Mass. achussets, and signer of the Declaration of Independence. There have been at least a thousand sets of that respectable old gentleman's furniture sold here and in Boston. Mine is the only original set, and this is why I have taken the liberty to carve a rudimentary H on the back of the roomiest chair. Every perfect set contains the old patriot's favorite chair. We always put a handsome silk band across the arms because we wish to retain for the purchaser the sole right to sit in it. This fine old piece is the chair known to have been used by Gen. Howe during his somewhat precarious residence in Boston at the revolutionary period. I have two letters strictly authenticating it. I regret to say, however, that from the number of Howe chairs in the market, that officer must have spent most of his time in moving from one chair to another, and done considerable more sitting down than fighting. This one is genuine."

"Certain lines of revolutionary articles are always good; people are only too anxious to believe in them. Washingtons, however, are

difficult to sell. The public must draw the line somewhere, and its generally at Washingtons and Jeffersons. A dealer spoiled the market for Washingtons. You see he sold a secretary with a contemporary certificate, and some fool held it up to the light and found the water mark to be 1850. Such manifest rascality injures business; it wound up the Washingtons, and I had to mark down a Martha Washington bedstead to an Aaron Burr. I did sell a Jefferson hat stand three years ago, but it stretches an honest dealer's reputation to make many ancient sales. Mayflowers I cannot conscientiously handle; no amount of swearing will make them go. De Witt Clintons and Hamiltons are all sent to Boston just now, and they sent us B. Franklins and Adamses, all having ancient certificates and Boston post-marks—in short, the most reliable evidence. Some of the letters, you will observe, are pasted under the seat. Here is something from Philadelphia—a chair which belonged to the honored Penn. See its strength and capacity—evidently made to order. Now here is the original which Nathan Hale sat on before his ex—"

"I see. Have you any sale for foreign goods?"

"Yes, but it doesn't do to keep more than three or four distinguished foreign articles in sight at a time. There's some furniture our public cannot swallow easily. As a rule, though, it is safe for a dealer to act up to the principle that his goods are as likely to be as authentic as not. If he doesn't know to the contrary, it is fair to affirm that his articles are what they look to be. Very many buyers, though, don't care for relics; they want respectable old furniture that looks as if it belonged to a wealthy old great-grandmother. Here and there you've got to remark that an article was found in—well, almost in Julius Caesar's garret. I had to sell a Maria Stuart sofa the other day. I had it laid out for a Hannah More, but had to mark it out to suit."

"The sources of supply—that is for genuine goods—is getting weaker and weaker. Grand-fathers' clocks, for instance, of good style and in fair order are scarce. I sold my last one for \$235. The customer told us plain out that he wanted something that showed 'ancestry,' and we let him have it. The New England States have been travelled through and through for them. Once in a while one turns up. The old carved bookcases and chests of drawers, mounted in genuine old-time brass, can be had now and then. Carved oak mantel and chimney pieces, tiles, tapestries, etc., are good when you can get hold of them. One trouble is growing weaker every year. We cannot get anything like full sets. Sometimes we have to wait a year or more before we can decently complete a room. Such collections bring very high prices. I know of one that fetched \$2,200. As for most of the ancient bric-a-brac, it should be regarded with suspicion. Revolutionary teapots were once a leading article on account of the firing of the tea overboard. But I regret so say that the demand was broken up by an unprincipled dealer whose fraudulent methods knocked the life out of what was once a very salable article."

"Yes, personal relics are to be had. Genuine ones are rare. There are dealers, though, who will sell you anything you want from a Gen. Putnam sword to the bull's-eye repeater of a delegate to the first Congress. These last articles are known to the trade as 'orphans.'"

"Oh, don't speak to me about manufactories of our goods. It is most awful to think of. Yes, sir, I know two factories where they done. It's an insult to liberty."

THE *Archiv der Pharmachie* gives the following formula for making paper for wrapping up silver. Six parts of caustic soda are dissolved in water until the hydrometer marks 20° Baume. To the solution add four parts of oxide of zinc, and boil until it is dissolved. Add sufficient water to bring the solution down to 10° Baume. Paper or calico soaked in the solution and dried will effectually preserve the most highly polished silver articles from the tarnishing action of the sulphureted hydrogen which is contained in such notable quantities in the atmosphere of all large towns.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Eighty-seventh Discussion.—Communicated by the Secretary.

[Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. Write only on one side of the paper, state the points briefly, mail as early as possible, as it must be received here not later than the eighth day of the month in order to be discussed and reported in the CIRCULAR for the next month.]

REFINING GOLD THAT WILL NOT WORK—MAKING EASY FLOWING SILVER AND GOLD SOLDERS.

Secretary of Horological Club:

I have just finished an experiment that turned out so successfully, that I decided to send it to you, as it may be of use to others in the same dilemma. It is known to those who work in gold, that there are times when a piece of that metal cannot be got to work, so, after having tried all the usual methods of refining and re-alloying, etc., only to find our time wasted and the gold as obstinate and unworkable as ever, that we are compelled to resort to a chemical process; we accordingly refine it once more, giving it lots of saltpetre, a good heat, and plenty of time—throwing in a pinch of table salt when the crucible shows a disposition to boil over. The result is an alloy composed of gold and silver. Nitro-muriatic acid will not dissolve this, because, after eating the gold off the surface, further action is prevented by a coat of silver that remains. In like manner nitric acid will not act upon it. Under such circumstances it is customary to melt about eight times its weight of silver with it, and when really hot, to pour it into a large vessel of water while an assistant agitates it briskly with a stick, so as to cut it up into small shot. (Some roll it out.) It is then dissolved with nitric acid, which leaves the gold in the form of a black sediment, which on being dried turns to a beautiful brown powder, and on being melted with a little borax runs off the gold. So far there is nothing new. We will say that we have two ounces of this alloy. This will require about sixteen ounces of silver. By the way, I have known people to borrow old silver from their neighbors in the trade, to be returned after having used it for this purpose. This is the fix I was in. I had no old silver, no neighbors to borrow from, and did not care to melt so much coin, especially as I had no use for it afterward; and still I had urgent use for this troublesome gold. I thought over the difficulty, and determined, although I had never known of such a thing being done, to use pure copper in the place of silver, with the most gratifying result—in fact, consider it much better than silver, for while copper only needs cold nitric acid and to be set aside where the fumes can escape, silver requires heat and constant attendance. The solution must now be decanted off the gold sediment into another vessel, and table salt added to it to throw down the silver; both these precipitates must be well washed in several changes of water, allowing them plenty of time to settle each time, and dry them well before putting them in the crucible to melt. The copper is recovered by putting a couple of iron bolts or pieces of iron into the remaining solution, upon which it will be found to deposit, and is pure, suitable for alloying gold.

While my hand is in, I would like to give you a dodge in making silver and gold solder. Years ago, I worked in a shop where a number of hands were employed, among whom was one celebrated for the goodness of his solder, and who made all the solder used in the shop. On my leaving the employ, this gentleman gave me the recipe, which turned out to be very simple, like everything else when you know how.

SILVER SOLDER.

Three dwt. coin silver; one dwt. English brass pins. Melt the silver alone with borax, bend the pins up double, and make them up in a compact little parcel in thin paper, so as to be readily dropped into the molten silver and not bristle up and stick to the sides of the crucible, as soon as they melt give your crucible a shake or two and run it into the ingot; if you leave it long in a molten state when the pins melt, the zinc burns out and impairs its quality. Have a good heat on before you drop the pins in, especially the lip from which you intend to pour off. It is not owing so much to any peculiarity in the brass of which these pins are made, although its excellence, and their convenient size recommend them, as witnessed by their general use by the trade for many purposes—but it is the anti-mony with which they are coated, that gives the solder its good

quality. It flows easy, it will stand chilling in the pickle and retain its toughness, is white enough to use on silver, and is suitable for all kinds of jobbing. To make gold solder, instead of reducing the quality of your gold with copper, silver, or brass, use the silver solder, made in the above way. I never keep gold solder by me; when I make a piece of jewelry, as soon as I get the gold worked out I take a piece of it and reduce it with about its own weight of the silver solder, on charcoal, with the blowpipe. It matters not if the work is to be bright or colored, it always comes out satisfactory. I have, however, made colored work always of at least 15 k. By what I have said, my solder will be say 8 k. Some will say, perhaps, that in such solder will not color; neither will it, but it must be borne in mind, that when pieces of gold are soldered together, the surface melts and combines with the solder, thereby improving 8 k. to 12 k. This of course will be a very easy running solder, intended for light work, and where a large number of pieces are to be joined; for a heavy job, don't reduce it quite as much. M. M.

Mr. Blowpipe said Mr. M.'s plan for getting around his difficulty was highly creditable to him, and showed that he understood the principle of the process, as well as the practice. It affords a good example of the advantage to a workman of being able to think, a faculty whose cultivation we have frequently advocated. We shall be pleased to hear often from Mr. M.

EXPOSED PALLET JEWELS FOR SWISS WATCH.

Secretary of Horological Club:

I have a Swiss watch, exposed pallets, for repair, with one of the pallet jewels gone. I ordered from a New York house "one dozen pallet jewels, for Swiss watch, with exposed pallets." They wrote me that "there is no such thing as exposed pallet jewels for Swiss watch." Thinking they did not understand my order, I wrote them again, with the same result. I then ordered from a Chicago firm, and had about the same reply from them. Will you or some member of the Club give me some information in regard to the above? Is there no such thing for sale, or was the trouble caused by verbiage of order? Yours truly, W.

Mr. Clerkenwell said what the dealers meant was that there was no such material kept on sale. Mr. W. will readily see, from the great number of different styles of "Swiss watches," that it would be useless to keep finished pallets in stock, as one might have a hundred different sizes and shapes, and yet not find one to fit. A few of the more prominent Swiss watch manufacturers supply their American agents with finished material for some special or leading patterns of their movements. If the watch Mr. W. has is one of these, and he knows who the American representatives are, he may perhaps obtain the exposed pallet from them. Otherwise he will probably have to make a new jewel or fit a pair of pallets to the wheel.

WORKING WITH THE LIVE-SPINDLE LATHE.

Secretary of Horological Club:

In examining the published proceedings of the Club, in July No. of CIRCULAR, I notice a communication from M. M., and although endorsed by such competent authority as Mr. Uhrmach, I feel in duty bound to vindicate the character of an old friend, (the live-spindle lathe) against misrepresentations. M. M. says, in regard to setting a pivot, "I do all this kind of work with bow and turns, and consider it the only correct way." While I agree with Bro. M. M. in his statement that there is some risk in relying on a split, drawing-in chuck, yet in three-fourths of the cases where inaccuracy occurs, it can be traced and attributed either to using a soft chuck and expecting it to hold drills, broaches and taps, and then to be in perfect shape to center a balance staff; or it may be that the chuck is too large, or a little too small for the staff, and the jaws only clutch it at the outside; or it may be on account of a poor working lathe—the purchaser expecting to get as good a machine for \$25 as he could for \$100.

Yet, admitting that there is a risk in using a steel chuck, what can be nearer to accuracy than a well centered cement chuck? I very often use a split chuck for a third or fourth wheel pivot, but I generally prefer a brass taper cement chuck for a balance staff or pivot. My method is as follows: After securing the brass taper in the chuck, I turn off the face perfectly smooth, to avoid being deceived in the center, then with a fine-pointed graver find the center, which I cut about as deep as the length of the pivot, using a strong glass. To test its accuracy, I take a long pin tongue, soften it, and set the pointed end in the female center just cut—holding the other end

against the thumb of my right hand; then, by setting the rest close to the chuck, and holding a thin slip of peg-wood under the pointed end of the pin as it rests in the center, and revolving the lathe, the slightest error will be detected by the "wink" of the pin. After being assured of the accuracy of the center, I next apply the cement. By the way—about $\frac{1}{16}$ of an inch from the end of the taper, I have soldered a small piece of thin brass like a washer, which holds the cement better and requires less heat to soften it. The pivot of the staff is then set in the center, and the cement heated until it softens and flows around the staff, and then allowed to cool until it will hold the balance without dropping out. Set the lathe in motion, and turn the other end of staff by holding a piece of pegwood at rest under the old stump of the broken pivot or the next shoulder, the remaining part of the operation of drilling, setting plug, and turning, has been often described in these columns, and in a manner which I could not improve upon, except by the cautionary suggestion that the plug be fitted so it will drive tight with the end touching the bottom of the hole drilled. A plug when fitted is of course a little tapering, and as the hole is the same size, when it is driven in it really binds only at the outside, which is the largest part; and for this reason, a pivot will sometimes work loose when it is being turned off, particularly if the hole is large, with little depth. This may sometimes be remedied by striking the small end of the plug lightly with the hammer, raising a slight burr on the end, and then driving it in as before. When working on a chronometer balance, I wrap the rim with wet tissue paper to prevent the heat from injuring it when cementing it on the chuck. In regard to softening the staff for drilling, I have heretofore projected the end to be softened through a hole in a thin piece of brass, and then blowing the flame of a spirit lamp across it, parallel to the balance, but since reading M. M.'s article, I have tried his way, and prefer it to mine. But I cannot reconcile myself to his idea of truing the staff for pivoting by the rim of the wheel. It might possibly answer when the balance is positively true, flat, and round—but when we take into account that three-fourths of the work we have to do of that kind is far from perfect, it merely adds complexity to what was at first a simple error, and renders it almost impossible to correct and unwind, what at first could have been easily accomplished, had the pivot been set true with the staff and the opposite pivot, without regard to the balance. J. H. S.

Mr Uhrmacher thought that the main difference between Mr. M. and Mr. S. was merely a matter of practice. Some can do a job more easily on the turns, others on the live-spindle. Each workman naturally prefers the sort of lathe on which he can do a good job, with the least trouble and time. As regards centering the staff by the rim of the balance, he presumed that Mr. M. would only recommend that way when the staff was known to be true with the balance rim. In any other case, the result would be to perpetuate the original want of truth, and make this original error more complicated, as Mr. S. suggests. We are glad to notice that our readers are beginning to express and discuss their views on practical matters more freely, and hope they will generally "follow suit," as we have so often suggested.

MAKING A SCREW FOR A MUSICAL BOX.

Secretary of Horological Club:

One of your readers inquired, last month, how to cut the screw to the fan or governing "eye" of a music box. I intended to have answered some time since, (next number), but that thief of time, "procrastination," kept putting it off—but here goes, *now*. Select a piece of steel wire a little larger than the entire diameter of the screw, and turn up a flank for your screw and staff. Of course the reader will understand that the piece of wire should be hardened and tempered to a spring temper. Now take a piece of fine iron binding wire, and wind it on a wire a trifle smaller than the size of the screw. Wind the coils close together, and when you have an inch (say) removed, remove from the large wire, and stretch it out like a spiral spring until the spaces between the coils exactly correspond to the spaces of the teeth which are to work into the screw; a gradual stretching is the best—stretch and try. Cut off $\frac{3}{8}$ of an inch of the fine wire spiral, slip it on the screw blanks, on which it should go easily—not too tight, but so the coils touch the screw blank. Soft solder this fast, and you have a guide that, with a double safe edge, file you, you can quickly file out a screw. Finish with emery—polish with rouge or diamantine.

DETECT.

Mr. McFuzee endorsed this plan, and said anyone with knowledge of gearing and a good mechanical eye would undoubtedly succeed

in making a screw that would answer all practical purposes. In that place, absolute accuracy is not necessary, the main points being to see that the teeth enter and clear without any approach to catching, and to have the bearing surface of the screw as smooth and finely polished as possible.

HEAVY SPRINGS IN WATCH CASES.

Secretary of Horological Club:

I must respectfully protest against the statement made by Mr. Clerkenwell, at your last meeting, that the large case springs complained of are made so large "in order to swell the profits of the case manufacturer." The fact is that the case makers, (except those who make for their own trade, or to order for individual customers), make no more profit on the cases with extra heavy springs, than on those with light springs. They do not, as a general thing, sell their cases to the retailers, but to jobbers—who of course insist on a price as low as the case makers can stand. We make them in that way because such cases are most called for and most salable. Any notable profit that may be got out of these loaded cases is made by the retailers or by the jobbers, and generally both parties profit by it. Hence it is unjust to throw the odium upon us manufacturers, because we make such goods as our customers want. If the retailers do not approve of such cases, why do they not stop buying them, and call for something else? Surely, if nobody would buy them, nobody would make them. But it looks hardly "square" for them to buy such cases and profit by the custom which they then turn around and denounce the makers for following in obedience to their demand.

As to the harm to the running qualities of the movement, by the heavy case springs, I do not see how that concerns us, one way or the other. I do not doubt that magnetized springs are destructive of regularity in the time-keeping, but we do not magnetize them—so, whether they are heavy or light, there is no reason for attacking case makers for the damage done by magnetized springs. We are quite willing to bear all the blame that justly belong to us, but we object to being made scapegoats for the sins of others, and therefore hope you will do us justice in this matter. Respectfully yours,

MANUFACTURER.

Mr. Clerkenwell replied that his former remarks had reference to makers who dealt directly with the retailers or watch wearers. In the case of large manufacturers who sell to jobbers, the situation would of course be different. But he was inclined to think that in most cases all the parties concerned had a share in the profits. As the retailers are the only parties known to the watch wearers, they necessarily have to bear the brunt of the public dissatisfaction. It is for them to apply the remedy, and they should, in defense of their own reputations and standing before the public, refuse to longer be participants in the practice of palming off steel and brass for gold and silver, upon customers who trust to their honesty in buying cases.

But he could not agree with "Manufacturers'" assertions that case makers are not concerned by the damage inflicted by magnetized springs. In the same way, the spring makers and the dealers who transfer them to the case makers could, with equal confidence, assert that they "do not magnetize them." They are certainly magnetized somewhere, or they would not be magnetized when they get in the cases. And, although spring makers and material jobbers often keep or use magnets very carelessly, he was inclined to think that magnets were more likely to be brought in contact with the springs at the case makers than previously. It was the almost universal custom of workers in the precious metals to use magnets for extracting particles of iron and steel from the filings and dust, before melting up. Very often the magnets lie around among the tools, stray springs, etc., and scarcely a shop can be found where some of the tools have not been magnetized. Every such tool is become an actual magnet, sure to magnetize every piece of iron and steel it is used to work upon. In one shop he observed that a magnet was kept in the case spring drawer, and used as a convenient way of taking out a lot of springs when wanted! There is a great deal too much carelessness about taking proper care of magnets, to prevent them from magnetizing tools and goods. This is the case even among watchmakers themselves, and many workmen who make a rule to hang their magnets up away from steel objects will often, while using them, lay them down among the tools and pieces on the work

bench. The magnetizing of case springs is a fault that all parties are responsible for, in a greater or less degree—and, while heavy springs are proportionately more injurious than light ones, the effects are always so injurious, and often so difficult to correct or remove, that everyone should take care that the mischief is not done while the work is in *his* hands.

AN EXAMPLE FOR JEWELERS TO FOLLOW.

Secretary of Horological Club:

I enclose you a slip cut from the San Francisco Chronicle of to-day, showing that the grocers of our city have attained to a higher plane of commercial ethics than we, and have set up a standard of trade honor of which they may well feel proud. It is as follows:—At a meeting of the Executive Committee of the Grocers' Protective Union last night, it was "Resolved, that no member of the Grocers' Protective Union shall purchase goods from any merchant or jobber who has been guilty of accepting a settlement for less than one hundred cents on the dollar, or allowing such parties with whom they make settlements to continue in the same business." All honor to the Grocers! When will dealers in gold, silver, and precious stones acquire backbone and honesty enough to follow that example of sturdy justice? Why should we wink at trickery, and allow professional bankrupts to compete on equal terms with men who honestly pay their debts, dollar for dollar? Are not we jewelers capable of taking as high and honorable a stand as our brethren in the grocery line? Please to publish this in your Proceedings, so that the trade may see that the world moves, even if we do not.

PURE GOLD.

Mr. Regulator agreed with "Pure Gold" that the grocers might justly pride themselves on being in a position to take such a stand. The practice of making such settlements was virtually offering a premium on recklessness and rascality. Men who paid in full for their goods could not compete with those who only pay 75, 50 or 25 cents on the dollar, and it was discouraging to the former, to see the latter class treated as well in all respects as themselves. Unfortunately, the practice was so common, even among the best jobbers and manufacturing houses, that he feared it would take a long time to rectify the evil, sufficiently to be able to pass and live up to such a resolution as the San Francisco Grocers' Union had adopted. He was not prepared to suggest a remedy except that which every dealer has it in his own power to apply, namely, to quietly transfer his custom from houses which are known to grant easy "settlements," to others which frown upon the practice. This is a duty which the cautious and honest dealer owes not only to himself, for his own protection, but also to those houses which assist in protecting him from such unfair competition by their refusal to submit to dishonest failures and prosecution of fraudulent bankrupts. A dealer is, in honor, bound to support houses which thus stand up for the honor of the trade, often at great trouble and expense to themselves. He also thought this subject was one which watchmakers' associations would do well to take hold of, with a view to united action for the checking of the practice.

Mother-of-Pearl and Pearl Inlaying

MOTHER-OF-PEARL is chiefly obtained from the pearl oyster (*Melagrina margaritifera*) which is found in the Gulf of California, at Panama, Cubagua, Ceylon, Madagascar, Swan River, Manila, and the Society Islands. The black-lipped shells from Manila are most highly prized. The Society Islands furnish the silver-lipped sort, and Panama the "bullock" shells.

The genera *Haliotis*, turbo, etc., also furnish some mother-of-pearl. Technically the mother-of-pearl obtained from the pearl oyster is known as white pearl; that of *Haliotis* or sea-ear as aurora or ear shell; it is easily distinguished from the former by its prismatic colors and wrinkled appearance.

The peculiar and varied tints exhibited by mother-of-pearl is due to the structure of its surface, which, owing to the great multitude of minute grooves upon it—often many thousands to the inch—decompose the light which falls upon it and reflects different hues.

The pearl shell is lamellar in structure, and admits of being split

into laminae, but this method of dividing it is seldom resorted to owing to the liability of spoiling the shell.

In working up the mother-of-pearl the saw file, and grindstone are the principal tools employed. A shell is selected with a coating of the substance of a thickness as nearly as possible to suit the required purpose. Square or angular pieces are cut out with a small circular or buck or fret saw to suit convenience, the piece being held and manipulated with the hand or clamped in a vise. Buttons and such circular pieces are cut with an annular or crown saw fixed upon a mandrel. All such tools used in cutting pearl must be kept well moistened with water to prevent over-heating. The pieces are usually dressed upon a grindstone, the edge and face of which are grooved or ridged to prevent clogging. The stone is kept wet in use; for this purpose weak soapsuds is better than water alone.

When the pieces have been properly shaped on the stone they are dressed with pumice stone and water. In some cases the better plan is to have the piece of pumice stone shaped so as to adapt it to the form required and held in a vise while the work, held in a clamp, is revolved in contact with it on the lathe. After the application of the stone fine powdered pumice stone, free from coarse grit, is applied with a cork or cloth moistened with water. In the final polishing rotten-stone is employed. This is moistened with dilute sulphuric acid (1 acid 15 water) and applied with a cork. The acid is said to develop finely the striated structure of the shell. In some works it is thought necessary to use emery before the rotten-stone and to use a linpid oil in place of the acid.

Knife and razor handles of pearl, after being roughed out, are drilled where the rivets are to be inserted, lightly riveted together, shaped on the stone, and finished as above described, the last finishing touch often being done by friction of the hand of the workman.

In some shops much of the polishing is done on cloth-covered wheels, the moist cloth carrying the polishing materials. Separate wheels are used for the different materials. For some common work powdered chalk or Spanish whiting is used in place of rotten stone.

Pearl is etched by a process very similar to that used in etching copper. The designs or patterns are drawn upon it with asphaltum varnish, and all parts not intended to be etched having been similarly protected, the piece is submitted to the action of nitric acid. When the parts unprotected have been sufficiently eaten away by the acid the piece is rinsed in cold water and the varnish washed off with a little turpentine or benzine.

Thin pieces of mother of pearl of a like pattern are usually gang-cut; that is, the thin plates are glued together, then held in a clamp and cut, drilled and dressed as one piece, after which they are separated by being thrown into hot water, which separates the glue.

In common pearl-inlay work, films or very thin pieces of mother-of-pearl are connected to a background, usually of *papier maché* or iron by japan varnish. The plate having been cleaned and dried receives a coat of the varnish, and when this is nearly dry the pieces of pearl, cut out with a scissors by the artist, to represent leaves or designs, are pressed against and adhere to the varnish. The plate is then put in the japanner's oven until the coating becomes hard. A second coating of varnish is then put on—indiscriminately over the pearl and all—and when this has been dried or hardened in the oven the portions adhering to the pearl pieces is removed with a knife blade, and the whole surface is rubbed smooth with pumice water and stone. With the aid of a little gold size, gold leaf and color, and camel's-hair brush the artist then develops the design, the beauty of which depends of course upon his skill. Finally the article receives a coat of clear spirit varnish.

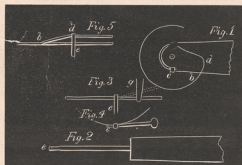
Besides the white and aurora shell referred to above, the glistening green snail shell is very frequently used. Its tints are light and dark green, yellow, and pink, blended. The varnish surface is sometimes ornamented with transferred drawings or engravings. When the varnish it nearly dry the engraving is spread out face downward upon it and carefully pressed so as to exclude air bubbles. After the varnish is thoroughly dry the paper is well moistened with warm water by means of a sponge. It may then be rubbed off, the lines of the print remaining adhering to the varnish.

Breguet Hair Springs.

HOW TO PUT THEM IN EXPEDITIOUSLY.

Continued from Page 125.

IN my former article I left the subject at the point of truing of the hairspring in the flat and in the round. I cannot help requesting the reader who wishes to profit by these instructions to read that portion of that article again before going further with this. As soon as your spring is satisfactory for truth, mark the notch in the hair spring collet on the balance arms, so that you can put the collet back relatively to the balance, the same as you had it when truing; for there is not one in five balances and collets which will stand change without disturbing the truth, especially in the flat; I mean by this that a spring running perfectly flat and true, if the collet is turned say one-fourth the way around that will still run true. For this reason it is better to put your collet on at first, so you can take it off and put it back, and have the split or notch come at the same place every time. It is not necessary to mar the balance to mark it; a mere touch under the collet on one of the arms is enough. In putting the watch in beat the roller can be put on to correspond to the position of the hairspring stud. I know it is easier to move the collet than the roller, but it is not so good if you seek perfection in your workmanship. We now come to making the bends; these may be divided into four, and described as follows: 1st, raising a portion of the outer coil so that we can return the outer end of the hair spring near the center; this bend is represented in the cut at *d*; 2d, correcting the bend above mentioned so that the part of the hair spring beyond is parallel to the main coils; this bend is shown at *d*; 3d, bending the hair spring inward, forming an elbow; this bend is near the point *d*; 4th, the terminal curve, which is acted upon by the regulator, and terminates in the hair spring stud *e*. In bending or making these off-sets and elbows, a tool is used, made of a piece of hard brass wire, about one-twentieth of an inch in diameter, set in a handle as shown in Fig. 2; the end *e* is shaped precisely like a loose



Swiss hair spring stud, except the hole is twice or three times the size. Enough of the outer end of the hair spring is put through and pinned in, to form all the bends. Fig. 1 shows the balance bridge turned bottom up with the outer coil of the hair spring and all the bends; the inner coils are broken out. The hair spring is supposed to be pinned into the handle stud *e* at the point *b*, and at right angles to it.

Corresponding letters represent corresponding parts in all the figures. A pair of tweezers is applied as shown at *g*. Fig. 4, and the first bend is made, (as shown at dotted lines); the tool *e* is shifted to *d*, and the second bend is made. Of course the reader will see that this bend determines the distance the return and main coils are apart; and he must be governed by the space between the balance and the bridge. This elbow must be calculated so it comes under the balance bridge, and when at rest should be nearly in the center as shown in Fig. 1. The elbow or third bend is made almost at the same point or place at which the second bend is made, but with this

difference, that the first two are made in the direction of the spring, while the third bend is inward toward the center of the main coils. It is well before commencing the bending to lay your hair spring on the bridge, arranging it so the center of the hair spring collet comes over the center of the hole jewel, and see which coil of the spring corresponds to the regulator pins and hole in the stud; recollect whether it is the third, fourth or fifth coil which so corresponds, and in making the fourth bend or terminal curve, let it correspond with this coil. Let the thickness of the tool *e* intervene between the second and third bend. Some springers use special tweezers with concave and convex points. These are quite unnecessary, as with common tweezers having narrow points the curve can be made, as the spring is held firmly by tool *e*. Here I would call the reader's attention to an important fact: *Every time you bend a hair spring so as to alter its shape you injure it.* For this reason learn to know exactly what you want to do, and do it with certainty of touch and in such a manner as not to need altering and doing over. In making bends, bend a trifle more than is necessary, so as to bend back a very little, as the bend is more permanent. To explain why: take a piece of main spring, and with your thumb nail give it a sharp bend; it is apparently set at a different angle, but it yields to a very slight force, and fully one-fourth of the bend is gone before the bend has the same rigidity as the rest of the spring. To know exactly where to make the first bend, or more particularly the second is a matter of experience—the old spring can be used, or a trial piece of spring can be bent, noting its length; but this is of small importance; the eye and experience will soon fix this part. Pin the spring into the stud without the balance, and manipulate it so it lies flat and the center of the collet coincides with the jewel hole. Put the spring on the balance staff, and put it into the watch and see if it lies flat—that is, not concave or convex from the rising part of the spring (from the bends *b* to *d*) being too much or too little; as a rule it is the best course to have the rise too much, as by squeezing the spring with the tweezers across the bends *d* and *b*, the angles can be reduced and the main coils and supplementary brought nearer together. Slight notches in the tweezers prevent the spring from turning down flatwise when correcting the bends. The spring, after these corrections should be removed from the balance but left in the stud, and tested again to see if the center of the collet and jewel hole correspond; hold the bridge so the coils are perpendicular and see if it is parallel with the bridge. To look over our work now, we see the hair spring *was* true to the balance before we commenced our bends, and it must be yet; it is true to the bridge and stud, and the attaching to the balance can in no way disturb it. If these rules are lived up to you produce a perfect job. All that remains now is the adjustments; heat and cold, and isochronism. These are points to be discussed with the customer, and I make mention of them here because it is of financial importance to the man doing the job to get paid for it. Many men will pay \$200 or more for a watch, but will grumble terribly at paying more than \$2.50 for a Breguet hair spring, for such, put in a spring as described, but have it understood that there are no adjustments, and that the customer must take chances on anything except a reasonably fair performance. If he should be willing to pay for adjusting, \$15 to \$20 extra should be charged; but the details of these cannot be more than mentioned here, and persons wishing to perfect themselves in these matters would do well to possess themselves of Excelsior's work on "The Balance Spring and Adjustment," published by D. H. Hopkinson, of this Journal. Mere heat and cold adjustments are very simple; if in summer, note the rate of your watch exactly by a standard regulator; then put your watch, (protected from damp) into a refrigerator, and see if it changes the rate; if the watch gains, it is not compensated enough; if it loses, it is over-compensated. In the first case move a pair of screws from near the arms, to near the cut or loose end of the compensating segments. If the latter case, move a pair from the cut ends toward the arms—always move opposite screws to opposite places so as not to destroy the poise.

To Regulate a Watch for Common Use.

BY MORITZ GROSSMAN,

*Watch Manufacturer, Member of the British Horological Institution of London,
Honorary Member of the Upper Italian Horological Union Gahlei.*

(Continued from page)

CONCLUDING REMARKS.

If the repairer has an anchor movement under manipulation, it is unconditionally necessary, to not alone have its separate actions correct, but he also must establish a perfect harmony between these separate actions. He will find that the careful examination of an anchor movement is by no means an easy task, since many points must be tested, on which depend partly or entirely the good performance and rate.

Let him first examine the wheel and action of pallets; he must ascertain whether the wheel is perfectly concentric and true in its division; any want of accuracy in these points diminishes the soundness of action, and shortens the mechanical effect, because the amount of drop and locking sufficient for a true and correct wheel would not offer the necessary safety of action.

The cutting of the wheel teeth is a matter not to be slighted, because the accuracy of the division would be prejudiced, if the surfaces of the teeth, and especially their acting sides, were not cut evenly and smoothly, presenting grooves which might, while coinciding with the point of one and not with that of the other tooth, affect the accuracy of the division.

The form of the teeth must comply with the work to be done the foreface being sufficiently inclined (undercut) to produce the draw without great friction or adhesion, and their back not more divergent than required for the solidity of the teeth.

The repairer next must ascertain whether the wheel and pallet are of the proper height to suit each other, and that the endshake of the escape pinion and pallet arbor are equal, or nearly so, to avoid the risk of alteration in the soundness of action, arising from the acting of the scape wheel at another part of the driving planes, than the highest point of this convexity. To secure this point, it is also essential to see that the wheel is perfectly true on the flat side.

He must also examine the locking and driving planes of the pallet, to see whether its surfaces are well polished, its edges carefully rounded, and the driving inclination is in the right proportion and direction, so that it may draw the pallet in without augmenting the unlocking resistance to any excess.

Some attention must be paid to the pallet and its shape, since it should not be heavier than is required by the nature of its work, and for solidity. It is necessary, moreover, that the space between the arms allow the wheel teeth to pass freely, without being filed out so much as to cause fear of breaking near the hole in the center.

Next try the action of wheel and pallet, to ascertain that the latter is properly pitched. This is often not the case, and if it be pitched too deeply, the effect will be an increase of the locking arc, consequently, an augmentation to the unlocking resistance, and to the arc of vibration required for the unlocking. Again, the drop will not be equally divided, too little will occur outside and too much inside the pallet, whereby the action is made unsafe. For this reason a defect of this kind cannot be remedied by exchanging the scape wheel for a smaller one; it would only amend the first deficiency, without correcting the inequality of the drop.

If the pallet is pitched too shallow, the locking will not be safe, and more drop will take place outside and less inside the pallet. Equally futile would be the exchange for a larger wheel, for the reasons mentioned above.

An alteration of the wheel's diameter, together with removing something or that part of the pallet where the drop is insufficient, would restore the requisite extent of the locking arc, and equalize the drop on both sides; but as this was formerly too much on one side, it will now be so on both sides, there will be an excess, and consequently a loss of power. Wherefore, in all cases where the pallet

is improperly pitched, the best way to correct the defect will be to alter the pitch in the direction required.

In cases where the locking is proper, but the drop on both sides unequal, the pallet must be considered defective and should be replaced, also one with too much drop.

To verify that the pallet arms are of equal length, the repairer should measure them, because if they are not, there is an inequality in the distribution of action between the two driving planes; the one lifts more, and the other one less than in should do.

Many important points with regard to the fork and roller action are also to be tested.

In the first place, examine whether the fork is solidly joined to the pallet (in those escapements in which fork and pallet are two separate pieces). Any shake between these two parts arising from the pallet arbor or the steady pin, not fitting tightly into the holes of either of the two parts, would occasion an unsteadiness of motion and loss of power. Such a defect is not easy to discover in a completed watch, although very easy to correct.

One of the most important points is to examine whether the angles of movement produced by both the wheel and the pallet action, and the fork and roller action, are exactly suitable to each other.

The lifting at the roller is simply dependent on the respective lengths of the two levers, or radii, if the angle of the pallet motion is given. But when the lever and roller are ready made, the angle of their lifting is in a certain proportion to the angle of the pallet movement, and the balance must be pitched exactly, so as to produce the angle of lifting, for which the proportions of the lever and roller are calculated.

For instance, if the balance is pitched at a distance from the pallet greater than it should be, a part of the impulse given by the lever is lost in useless drop.

Still another inconvenience arises from such incorrect pitching, the ruby pin, in both the unlocking and impelling functions, does not properly meet the acting faces in the fork notch. In such cases, the unlocking and impulse would occur at the edge of the notch and horn, or the beginning of the horn, with decided mechanical disadvantage.

If, on the contrary, the balance is pitched too close, it will result in the necessity that the banking pins must be set farther apart to allow the ruby pin to freely perform the increased angle of lifting. By this wider banking, the pallet will be drawn further into the wheel than it ought to be, thus increasing the locking resistance. At the same time the unlocking function of the ruby pin will be rendered more difficult by its taking place at a greater distance from the line of centers, not to speak of the liability of the ruby pin to touch the bottom of the fork, which is not intended for this deeper intercession.

The effects, however, of an incorrect pitching of the balance, although very grave for the performance of the escapement, may very easily be removed by an alteration in the length of the two parts. But as the lever is generally finished when the escapement passes the examination, we will suppose that it must not be touched, and that the above mentioned defects must be removed by altering the place of the impulse pin. In the first-mentioned case, this must be removed a little nearer to the roller edge, to establish a sound interconnection, and to turn to profit the whole angle of pallet motion.

The alteration, be it understood, however, while it restores the correspondence of the lifting angles in the two actions, for the given center distance, produces a diminution of the angle of lifting intended for the balance. If, for instance, the 10° of pallet movement were intended to produce a lifting of 40° at the roller, and the lever and roller were made accordingly, but the balance had been pitched at too great a distance, the angle of lifting would, by the subsequent alteration of the impulse pin, be reduced to 36° or 33° , but the angles or the two actions would correspond to each other, and the escapement, although not having the lifting angle originally intended, would still be correct in itself.

In the case of the balance being pitched too close, the opposite

proceeding will be advisable. The pin must be approached to the center of the roller, by doing which, the angle of lifting at the latter is increased. If the circumstances admit it, the fork may also be shortened a little by taking away slightly all along the inner faces of the horns, thereby reducing the acting lever length a little, in order not to alter too much the intended lifting angle. The acting parts of fork and roller must be finished as smoothly as can be, also the outer edge of the table roller and the inner sides of the horns.

The ruby pin must be fixed upright in the roller; and inclination in whatever direction is defective. Also care must be taken that the pin is tightly fixed in its hole, and that the notch of the fork be of a size suitable to permit of the necessary freedom of action.

Examine the horns, and see that their length is sufficient to complete the safety action during the time that the guard pin passes the hollow of the roller. To test this, bring the balance into position in which the guard pin begins to enter the passing hollow. When in this position, the end of the horn should reach at least to the middle of the breadth of the impulse pin.

In escapements with double roller, the horns of the fork must be longer than those of the table roller escapement, because the safety action has to perform a much larger arc of intersection; and the eccentricity of the horns may be supposed sufficient if the balance stands with the guard pin just out of the hollow, and the end of the horn keeps at a very little distance from the impulse pin, when the guard pin is pressed lightly against the edge of the roller.

A defect with very injurious results to the rate of a lever watch with double roller in different positions, is an excess of a length of the impulse pin, when its end comes too near the index, and touches it in any position of the watch. A difference of the endshake between the balance and pallet staff often causes this result, wherefore these two parts and the escape wheel pinion should have as nearly as possible the same quantity of endshake.

The necessary freedom of the guard pin at the edge of the detaining roller and in the passing hollow must also engage the attention of the repairer. Defects in this direction are very often caused by too much sideshake of the balance pivots in their holes, wherefore these must also be carefully inspected in regard to width. If necessary, the guard pin or index must be shortened somewhat, to obtain the required freedom of action.

If, on the contrary, there is much space between the end of the guard pin and the roller edge, so that the wheel tooth is not on the locking when the guard pin is lightly pressed toward the roller edge, and the impulse pin butts against the end of the horn, the safety action is defective, and must be corrected by the insertion of a larger roller, or a longer guard pin.

Also observe that the notch in the fork is deep enough to let the impulse pin pass freely without getting too near the bottom.

Attention must be paid to ascertain whether the horns of the fork are not too long, so as to rest with their ends against the balance axis.

Examine both pallet and lever as to their equisposition, and if necessary, carefully establish it. Serious differences of rate in the positions are caused by a want of equisposition, especially in watches with levers oblique or at right angles to the vertical line from the pendant through the middle of the watch.

Finally, scrutinize the width of banking; this should be no wider than simply to permit the indispensable freedom for the movement of the acting parts. It also is very essential that the banking pins are straight and vertical to the plate; if they are not, and the pallet staff has a little too much endshake, the width of the banking will be considerably altered, whether the watch is lying on the back or on the glass, especially when the banking pins are not standing near the end of the fork of the lever.

Anchor watches whose escapements possess none of the above-mentioned defects, offer very good promise for a satisfactory performance.

The Breaking of Springs.

MUCH has been said about the breaking of springs and their causes, but the subject remains ever new. A correspondent in a German newspaper gives the following views:

Every watch spring will finally arrive at the period when it will break. Repeated concussions will burst a cannon, break an axle, and cause the breakage of a rail. Caused by the unceasing bending to and fro, of a piece of metal, its cohesion will be destroyed, and it bursts or breaks. Since from the preceding it cannot be expected that watch springs are an exception, we may only consider what means will hasten or retard the final breakage. We may specify the following points:

1. Hardness and quality of the steel; 2. dimensions (measure); 3. treatment; 4. change of temperature; 5. crystallization, decarbonization, and electrical influences.

1. Steel is composed of iron and carbon. If we heat it in the fire for the purpose of hardening, the carbon endeavors to disengage itself. In this condition we suddenly plunge it into some cold fluid; the carbon crystallizes, penetrates the iron with its diamond-like molecules, and the steel becomes so hard as to cut glass. This is a practical reasonable theory, and undoubtedly the true one, since the microscope can substantiate it, and we will accept it for want of a better.

If we temper the steel blue, a retrograde chemical action takes place. The circumference of the steel increases a trifle, and it is, as it were, enveloped in an impenetrable coating, within which the molecules or atoms arrange themselves. This imparts the elasticity. When this extremely thin colored envelope is removed, a part of the elasticity is lost. Hence, a blue spring has more power of tension than a white one.

In accordance with the unequal disposition of the carbon in steel imperfections can be inherent in the spring, and an undue hardness is produced in any one or more of its parts. Such imperfections may also be engendered by an unequal heating, so as to disturb the local proportions of the carbon. Defects of this nature cannot be detected by the eye, and the watchmaker can only observe the breakage of springs, due to such bad treatment, by using those of a recognized good standard.

2. One proportion of spring dimension is preferable to the other. The use of a broad and weak spring is preferable to that of a narrow and strong, and by right proportions, the like power may be had.

A thin steel at bending does not suffer a displacement of its atoms as much as a thick one, because the rounded side of the first is nearer to its fulcrum, or the point around which it bends or moves. A thin piece of glass may be bent, while a thick one shatters with the least attempt. A recommendable proportion of the spring would be a gradual decrease of dimension of its coils, as they would more concentrically accommodate themselves around the core; this only applies to movements with fusee; the best form for movements with toothed barrel is an equal thickness throughout its entire length.

2. When we wind a spring close around the core, we obtain more coils than it has when at rest against the barrel wall. The difference in the number gives us the revolutions which the spring will make when being wound.

If the space between spring and core is large, and we made use of its entire power, or, in other words, we do not use a fusee and stopwork, the elasticity of the spring would be increased, also the danger of breaking, than if less room were at disposal.

The use of the whole unconfining spring power produces friction of its coils by the tightened elasticity, destroys the colored lamina of the spring blade, and thus lessens its elasticity, the surface becomes porous, and inclines the spring to breaking.

Also the same defect is often produced by too strong a winding of the spring, both in movements with fusee and in those with toothed barrel and stopwork. This is often done for the purpose of overcoming a cramping or friction in the movement, or some other error,

a correction of which is very difficult, and it is sought by this means to conquer it by an increased power of spring; sometimes it is intended to produce the greatest possible balance vibration. This doubtful remedy is oftener the cause of a spring breaking than all the others taken together.

The following is a right proportion of the spring: 14 coils (never less than 12) must lie within the spring barrel; the empty space between the spring and the core must amount to fully one-third of the barrel diameter, and the core must also measure one-third; it should be fuzee form, and with the beginning of the first inner spring coil, be a complete circle, in order to impart as concentric a motion as possible. A protruding core hook is to be avoided, and that of the barrel must be kept as low as consistent. If all these conditions are complied with, the spring will make about six revolutions, if wound up to within $\frac{1}{2}$ or $\frac{3}{4}$ turn, and there is obtained for a toothed barrel, making four turns, a spring power in its best attainable proportion.

The French pendulum clockmakers have the senseless habit of making the spring arbor hook as projecting as possible, as if experimenting to find out how much the spring would resist. I can explain the proportionately few breakings of such springs only from the reason of their great breadth and thinness, which also protects them against an undue expansion, conjointly with the lubricating, gum-like oil, which protects them against any injurious effects of friction in its coils. Finally is the careless treatment and the putting in of the spring with too small a core often the reason for a subsequent breaking.

4. If a spring in a barrel with stopwork, without making use of its duty, is wound to its utmost expansion, and the temperature would suddenly change from heat to cold, a sudden snapping, owing to the molecular change of the steel, would be inevitable; even if the spring were not wound to its utmost, a break may easily occur, because the condensation of the steel takes place suddenly, consequently a change in its outside molecular arrangement; it is well known that a hot lamp chimney will suddenly shatter when exposed to a cold air draught. A breaking of the spring consequently will occur most frequently in spring, fall and winter.

5. All metals subjected for any length of time to tension, crystallize, and exhibit an inclination to return to their previous crude condition. When this happens, they part with their cohesion by exhaustion, and a separation of the molecules takes place sooner or later, in due ratio with the sum of the tension to which they were subjected. Since steel, however, possesses greater cohesion than nearly any other metal, it would resist this natural law longer, if other powers did not combine to decarbonize and consequently to ruin it. The main factors producing this change are heat and electricity. One is permitted to say heat is electricity, and electricity is heat. Both expressions are synonymous. All metals contain latent heat and latent electricity, which may be excited by nature, by chemical influences, and by friction.

The main factor in an electric machine is a glass plate (isolator) on which by friction an electric current is generated. The same is produced by the friction of a hand on the watch crystal. If of steel, it will be partly destroyed at the point of contact, betrayed by the rust which is formed at this place. This rust is generated by electric heat. The friction of the coils of a watch spring against one another, also engenders electricity, especially in warm weather, when it is assisted by the peculiar condition of the air. The steel becomes decarbonized hereby, and thus is induced the unaccountable, mysterious breaking of the spring during hot weather. A balance spring hardened in fire suffers by its inelastic condition an inner friction of its molecules, hence the tardation of rate during very hot electric weather. Different individuals are better or worse conductors of electricity, hence the difference of the rate of one watch, when worn in succession by different persons. The more humidity a body absorbs, the better a conductor of electricity it is; whence a balance spring with closed parts is not as good a conductor as a white and porous one.

Galvanism, or Voltaic electricity, is generated when two different

metals touch each other, and one is influenced by an acid. A brass spring barrel with a steel spring and an oil containing acid together constitute a galvanic battery, set into action by heat. The less acid the oil contains, the less is the quantity generated, but sufficient to keep the spring slippery, and the less is the danger that free galvanism is developed; but the air often furnishes an acid (humidity) causing the battery to become active. Heat is produced by this, and the metal is ruined. If chronometers and watches did not contain so great an amount of brass, and consequently so active a conductor of electricity, radiating it into space, it would perhaps be difficult, to even have a time measure with a balance spring. A marine chronometer is better protected than a watch, because surrounded by bad conductors, or good isolators; from the moment forward that a watch taken from a cold room comes in contact with the heat of the body, the electric current begins. Springs wrapped with brass wire and oiled with the common olive oil, become so vitreous in one or two years in the tropics that they break like glass. This is my own experience.

Those who wish to inform themselves farther on this point, I would recommend a study of the generation of friction or galvanic electricity by steam engines.

Views of Correspondents.

This department of THE JEWELERS' CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

TRADE SOCIETIES.

To the Editor *Jewelers' Circular*:

Being an old subscriber of your valuable CIRCULAR, having received it about twelve years, I consider it an indispensable guide to our trade. In looking over the July number I saw a notice of a meeting of the jewelers of Rochester, N. Y., May 26th, to form a union for the protection of jewelers and their customers from the frauds perpetrated by a class of manufacturers that have no respect for reputation or honesty, in making and selling cheap plated goods, and representing them to be good rolled plate, and I am sorry to say, the oldest of us in business are sometimes deceived by them. A few days ago I took back a locket represented to be the best gold plate. My customer told me he had only worn it two months. I buy my jewelry of reliable houses in Rochester and New York city, and have often remarked to them that the so-called rolled plate jewelry we have been getting of late, is not what it used to be; that we could not recommend it as being reliable and tell our customers the truth. Four or five years ago we could sell rolled plate jewelry, and know that it would give our customers perfect satisfaction; it is very encouraging to have our customers tell us that the articles we sold them five or six years ago are good yet. On the other hand it is very embarrassing to have our customers come to us and tell us that the plating was wearing off the goods we sold them three or four months ago, and that we either lied to them, or were deceived ourselves. If the jobbers haven't the pluck to crush this evil, let us retail dealers do it. Perhaps the jobbers encourage that class of cheap plated goods, as it leaves them a better margin. If so, let us investigate, and buy of none but those who will manufacture and sell honest goods. Being in the trade from boyhood, I am anxious to connect myself with a union that will protect us in reputation and honesty.

E. W. C.

THE DRUMMER TAX LAW IN TEXAS.

To the Editor of the *Jewelers' Circular*:

In the CIRCULAR for July I noticed your comments upon the "Drummers' Tax Law," as you doubtless believe exists in the state of Texas, and as obnoxious as it may be it is yet in existence and being enforced. I notice that the idea begins to prevail that the law cannot be enforced because the Supreme Court of the United States has decided that it was unconstitutional. This is not the case. The Supreme Court has made no such decision, but on the contrary, there is a decision of this court just to the contrary.

In the case of J. T. Webber, plaintiff in error vs. the state of Virginia, the facts before the Supreme Court of the United States were as follows: Webber was a salesman for the Singer Sewing Machine Company, and was arrested for selling goods without a license. The law in Virginia reads that "The agents for the sale of articles manufactured in other states must first obtain a license to sell them, while

the agent for the sale of articles manufactured in the state of Virginia, if acting for the manufacturer, was not required to take out a license." This was clearly in conflict with the constitutional provision relative to the inter-state commerce, and the Supreme Court of the United States on appeal, applying its decision to every state in the union having a similar law. But the Drummers' Tax Law of Texas is not a similar law.

In Virginia the law exempted the home manufacturer, the manufacturer and merchant is taxed just the same as the manufacturer and merchant of another state, and this makes a big difference—such a difference that the law of Texas is not unconstitutional, for the Supreme Court of the United States long ago decided that while the state made no distinction between its own citizens and the citizens of other states in the matter of its license tax, it has a right to levy such a tax and could force a collection.

I can assure all commercial travelers, merchants and other persons interested, that the decision of the United States Supreme Court in the Virginia case does not touch the Drummers' Tax Law of Texas, or affect it in the least.

I have written you this simply to direct your attention to the law as it now exists, because there is little being said at this time about the Drummers' Tax Law of this state, and as a large class of people, commercial travelers and merchants, are directly interested.

Very respectfully, L. M. K.

LIGHTLY PLATED GOODS.

To the Editor of the *Jewelers' Circular*:

In your issue of July, G. A. R. justly complains against the sale by silver plated ware manufacturers of goods in metal. Your correspondent, however, is in error when he states that he can "buy Messrs. — or any other manufacturer's goods in the metal, and plate them here." We cannot speak for the firm named, but we can for many of the "other manufacturers." The most stringent by-law of the Silver Plated Ware Association prohibits such sales except among themselves, and attaches a heavy penalty for its violation.

The purchaser of electro-plated ware can estimate its value only by the stamp of the maker, which, like the English Hall mark, guarantees its quality. It is the duty of every dealer to instruct his patrons to examine such trade marks. When the consumer can himself distinguish between reputable and disreputable ware, G. A. R. will have no more cause to complain of "lightly plated goods" than he has now of honorable manufacturers. J. W. M.

WANTS HIS PERQUISITES.

To the Editor of the *Jewelers' Circular*:

I have been a reader of your paper a long time, and like it for the news it gives about the trade, but I do not always agree with what you say editorially. You are all the time talking about the morality of the trade and abusing those who handle cheap goods. There's where you make a mistake. Dealers must handle these cheap goods or they can't make any profit. There are so many in the business, and competition is so great, that we can't get any profit on genuine goods. Consequently we must rely upon selling the public the cheaper goods, and make our profit on the difference in quality. You say it is swindling people to sell them cheap goods when they want a better article. How do you make this out? A man comes into my store and wants to buy some jewelry; I show it to him, and he selects what pleases his fancy; he likes the design, the workmanship, but, of course, don't want anything but the quality. I tell him it is 18 karat; everybody thinks good gold must be 18 karats, so I tell him so. He buys the goods, and is perfectly satisfied; nobody knows that they are only 10 karat goods but experts, and he don't show them to experts. By selling 10 karat goods as 18 karat I have made a profit; if they had been 18 karats I couldn't have got any more for them, and shouldn't have made a cent. I think this is legitimate; I must make a living, and the only way to do it is to sell cheap goods. It is the custom of the trade—everybody does it. You say that the heavy spring in a watch case is a swindle. How so? The man who buys the case knows there must be a spring in it, and what difference does it make to him how heavy it is, so long as the outside pleases him and he is satisfied? We dealers can buy these heavy spring cases cheaper than we used to when the springs were lighter, and, of course, we make more profit on them. If it was not for this we could not make a living. The business is bad enough any way, and yet you want to deprive us of these little perquisites. The expenses of a dealer are very heavy, for he must have a nice, attractive store, a good watch repairer, and he must also carry a large stock of goods, many of which he will keep on hand for years before he sells them. There is so much competition that he must sell his goods low or he can't get any trade. The only chance he has to make a profit is in the quality. When a customer comes to me and wants to buy a gold

watch, I can put the case right on the scales and show him just how many pennyweights it weighs, and he is satisfied. I can only charge him the price of gold for it, and if it was not for the spring and trimmings I should lose money. But, as it is, there is no money now in the jewelry business. Where can you find a retail jeweler that has got rich? Not any. But I can show you many of my acquaintances who have made money in the dry goods business, in the clothing trade, and other lines. Almost everything pays but jewelry. I have a son about fourteen years of age that I expected would succeed me in business. I have kept him about the shop to teach him, and he has shown a good talent for the trade. One day a man came in to find out what was the matter with his watch; he had just had it cleaned by another repairer. My boy took the watch in his hand, and, with a screw driver, took some dirt from under his thumb nail; then he opened the watch, looked inside, and then held up the dirt on the tool and told the man that was what ailed his watch. I got the job of fixing the watch and charged \$2.50 for it; nothing was the matter with it, only the hands caught. But that dirt my boy took from his nail was what got the job. Now I think that was very sharp for a little boy like him. But in spite of the talent he shows for the business, I shall not bring him up to it, because there is no money in it. I want to see him a rich man, and think I shall get him in the clothing trade. THE CIRCULAR is doing much harm by showing dealers how goods are debased in quality. This is not right. You pretend to be a friend to the trade, and yet do all you can to injure it by showing how we make our profit. If you don't stop it you will lose the support of the trade, for I know many dealers who feel as I do about it, and will stop their subscriptions. I like your paper for the news you print about the trade, and for the articles on watch repairing, but I don't like your moral sermons. It is your business to attend to the news, and let the trade take care of its own morals. H. J. P.

The Hollow Pinion.

MR. LINDERMANN, an eminent German horologist at Glaschitz, Saxony, in answer to a correspondent who expressed himself in favor of the adoption of hollow pinions, says: The cycloid depthing, in a common pinion of less than twelve leaves (the driving by one of the ten leaves does not yet occur before the line of centers) a correct form being assumed, does not prevent the driving from being uniform. The question simply occurs, if a greater quantity of the motive power is consumed.

As long as the static moments simply are considered, without regard to friction, no correct picture of the operation and the power consumed by friction can be had, the transmission of power appears to be perfectly uniform. But wheelwork without motion is good for nothing. The watch must go.

To ascertain the different proportions, I took the depthing of a common 6-leaf pinion, engaging with a 60-tooth wheel, and placed it in positions of 20° before, and 20° and 40° behind the center line; also a 6-leaf hollow pinion, engaging with a wheel of like number of teeth, and by adding friction, calculated the consumption of power. The driving of such a 6-leaf pinion engaging with a 60-tooth wheel, must commence at least 17° 44' 15" before the line of centers. I calculated for a depthing with hollow pinion the positions of 20°, 40°, and 60° behind the center line, assuming the ratios of friction in both cases at .14. The following is the result:

Mean motive power consumed by friction of common pinions is .098; hollow pinion, .124; consequently 10 per cent. in the first, nearly 12½ per cent. in the last case; the latter is 2½ per cent. greater.

An increase of motive power also increases the friction of pivots; and 2½ per cent. are not enough for practical use, 4 per cent. would be nearer.

From a theoretical point of view, we find that common pinions are better, and from a practical one, they are better also.

SCIENTIFIC men have proved by actual measurement that most of the great silver mines lie 10,000 feet above the present sea level, and among the richest are some which lie 2,000 feet higher still. Very rich mines have been found as high as 16,000 feet. It is a notable fact that as a rule the richest silver mines lie over 10,000 feet above the sea level.

Novel Machine for Demagnetizing Watches.

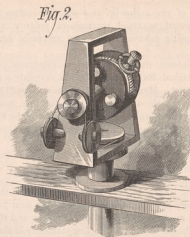
(From the Scientific American.)

WITH THE extensive use of dynamo-electric machines there arises a difficulty which is experienced by almost every one who comes into proximity to one of these machines; that is, the magnetization of one's watch so that its time-keeping qualities are seriously interfered with, or it stops altogether. Several methods of demagnetizing watches have been proposed, some of which operate with a certain degree of success, but all are more or less troublesome and uncertain.

Mr. H. S. Maxim, the well-known mechanical and electrical engineer of this city, has lately perfected a piece of apparatus which is exceedingly simple and perfect in its action, and it may be used not only on watches and other small machinery affected by magnetism, but also on tools of any form or size.

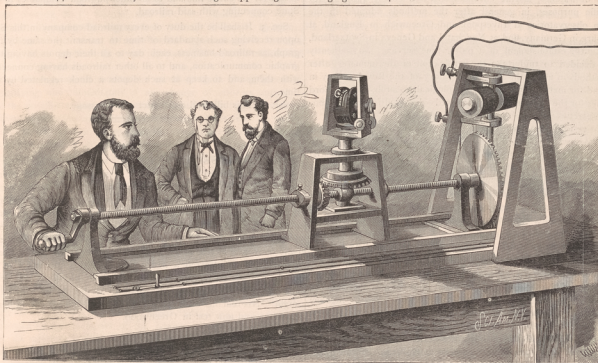
The device consists of a bar electro-magnet, mounted on a vertical spindle so as to revolve endwise in a horizontal plane. It receives a current from a dynamo-electric machine or galvanic battery, which is transmitted to the magnet wires through springs bearing on the insulated collars above and below the magnet, these collars being connected with the terminals of the magnet wire. The frame supporting the magnet spindle is attached to the end of a bed piece having on its upper surface ways for the carriage supporting the

and around the fixed wheel, so that as the watch holder frame is



ENLARGED VIEW OF WATCH HOLDER.

revolved in a horizontal plane the watch is revolved in an ever-changing vertical plane.



MAXIM'S MACHINE FOR DEMAGNETIZING WATCHES.

watch. This carriage is moved along on the bed piece by a screw having at one end a crank and at the other end a bevel wheel which meshes into a pinion on the magnet spindle.

The watch holder is mounted on a hollow vertical spindle opposite the poles of the magnet, and takes motion from the screw through a bevel wheel fixed to its lower end, and driven by a pinion carried by the carriage but rotated by the screw, the screw being slotted and the pinion being splined for that purpose. The watch holder is supported by a frame attached to the end of the hollow vertical spindle, and a small wheel is supported inside of the watch holder frame by a fixed shaft running downward through the hollow spindle and attached to the lower portion of the carriage.

The chuck in which the watch is placed is revolved by a belt passing over a pulley on the end of its shaft, under guide pulleys

The operation of demagnetizing a watch is very easy. The watch is placed in the holder, and the carriage is moved up as near the electro-magnet as possible. The shear nut on the carriage is then brought into engagement with the screw, and the magnet is rotated rapidly, the watch at the same time receiving a compound rotary motion which brings every side of the watch in opposition to the poles of the magnet. The electrical circuit is thus completed through the magnet by means of the switch at the side of the bed piece, and the rotary motion is continued until the carriage has reached the end of the screw remote from the magnet, when the electrical circuit is broken and the work is completely done. It was our good fortune to witness this operation on a watch that was so thoroughly magnetized as to be incapable of making a single stroke of the escapement lever. When it was taken out of the machine its motion was

perfectly free and normal, and the most delicate tests failed to reveal a trace of magnetism.

The theory of the action of this machine seems to be that the watch is subjected to rapid reversals of polarity in a gradually weakened magnetic field until the final reversals were practically nil.

Mr. Maxim informs us that the machine illustrated is intended for the Paris Electrical Exhibition. That is certainly a good field for an exhaustive trial. Messrs. L. & A. Mathey, the well known importers of fine watches, No. 16 Maiden Lane, this city, have the exclusive agency for this ingenious instrument. It may be seen in operation at their establishment, where watches may also be sent for demagnetization.

The Winchester Observatory.

PROFESSOR LEONARD WALDO, in charge of the Winchester Observatory at Yale College, has issued in neat pamphlet form his first annual report to the Board of Managers, and it is now being generally distributed to the trade. The managers of the observatory have done an excellent work for the science of horology, and the report of the first year's work shows that great progress has been made. The observatory work at first contemplated was the examination of watches, marine chronometers, and clocks designed for scientific purposes, in general after the methods adopted in the foreign observatories at Liverpool and Greenwich in England, at Hamburg in Germany, and at Neuchatel and Geneva in Switzerland, and also the establishment of a public time service. Subsequently it was decided to undertake the verification of thermometers after the methods in use at the Kew Observatory of the Royal Society in England for meteorological and physiological research, and to afford facilities for the comparison of standards designed for more elaborate researches in heat.

Relative to the establishment of the State Time Service, the report says: "After the work had been fairly started of rating time-pieces, the local time service for New Haven which had been contemplated in the first plans of the Observatory, was put into operation. For the purpose of establishing uniformity in public time the following named firms make an annual subscription to the Observatory funds, and we have placed in their respective places of business telegraph instruments which continuously repeat the beats of the Observatory clock: J. B. Sargent, Esq.; O. B. North & Co.; Mallory, Wheeler & Co.; Henry Hooker & Co.; B. Shoninger & Co.; The City Bank of New Haven; E. M. Reed, Esq.; W. & E. T. Fitch.

In addition to these gentlemen, the jewelers of New Haven availed themselves of the Observatory time, and this support enabled the Observatory to commence its public time service. Mayor Bigelow assumed the responsibility of setting the City Hall clock to the time of the Observatory which for reasons given further on is the local time for New York City Hall. It was a gratifying circumstance that he should subsequently, in the capacity as Governor of the State, have signed the bill making this the standard of time for the whole State. The extended use made of the Observatory time by the New York, New Haven & Hartford R. R., and all its divisions, the Naugatuck R. R., the Boston & New York Air Line R. R., the Connecticut Western R. R., and the Connecticut Valley R. R., and the manifest injustice of allowing the expenses to devolve on the Observatory, lead to the consideration of the question as to the expediency of making it a subject of State legislation. This would imply the organization of a Public State Time Service—the first in this country—after the model of the government service abroad. It was an open question as to whether our people were sufficiently educated to appreciate the public economy of having the State governed by a common time. A conference with the leading railroad men of this State led to the cordial support of the plan proposed by the Observatory; prominent legislators in the two parties in the State legislature, after due explanation on our part, were persuaded that it would

be to the material advantage of the people to have an accurate standard of time, and with this encouragement we undertook what seemed at first a discouraging task. After two hearings before the railroad committee, and after various measures making the service more convenient to the railroads now using Boston time had been adopted by us, the accompanying bill was unanimously passed by both houses upon the recommendation of the railroad committee.

AN ACT ESTABLISHING A STANDARD OF TIME, GENERAL ASSEMBLY, JANUARY SESSION, A.D., 1881.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. The standard of time for the meridian of the city hall, in the city of New York, shall be and is hereby made the standard of time for this State.

Sec. 2. To enable this standard of time to be accurately determined and furnished each day the comptroller of this State is hereby authorized to contract with the corporation known as the "The President and Fellows of Yale College in New Haven" at a sum not exceeding two thousand dollars a year to furnish such time at least once every day (except Sunday) to the New York, New Haven and Hartford Railroad Company, at their depot at New Haven, to be transmitted by telegraph by said railroad company, as railroad business, over its entire line and to all other railroad companies in this State connecting with said railroad.

Sec. 3. It shall be the duty of every railroad company in this State upon receiving such standard of time to transmit the same by telegraph, as railroad business, each day to all their depots having telegraphic communication, and to all other railroads having connection with them, and to keep at such depots a clock regulated by said time.

Sec. 4. This bill shall take effect on its passage.

Obituary.

WILLIAM JOSEPH OLIVER, only son of Richard Oliver, of this city, died at Ashley Falls, Mass., June 28, in the twenty-ninth year of his age. The deceased was a most exemplary young man in his bearing, courteous and affable in his manners, and beloved by all who knew him. He was associated with his father in business for many years, and had been trained by him to a thorough knowledge of the jewelry business. A few years since he became enthusiastically interested in rifle practice, and it was while shooting at Creedmoor that he contracted a heavy cold resulting ultimately in his death. Young Oliver possessed an excellent physique, was active and energetic in his nature, and whatever he did, he did with all his might. His remains were brought to the residence of his father in Brooklyn and now rest in Greenwood.

LOUIS A. SCHERR, senior member of the firm of Louis A. Scherr & Co., of Philadelphia, died at Robosonia, Pa., on the 20th of August, after a slight illness, aged 42 years. Mr. Scherr had been in delicate health for a number of years, having had several slight hemorrhages of the lungs at irregular intervals. During the hot weather he took his family to the country to recreate, visiting his place of business for a day or two each week. On Tuesday Aug. 16, he was prostrated by a severe hemorrhage, which weakened him exceedingly, and on the recurrence of the attack the following Saturday, death resulted immediately. Mr. Scherr was an earnest, capable business man, enterprising beyond his strength, and was greatly respected by all who knew him. A widow and one child survive him, and a large circle of friends sympathize with them in their great affliction. Mr. Scherr was a courteous, pleasant gentleman, who made friends of all with whom he came in contact, and it is believed that he had not an enemy in the world. The trade in Philadelphia will greatly miss one who had been so active in their line of business.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the exclusive official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. We therefore devote this column to the interests of the League and its membership. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box 4001, P. O., New York, or the office of THE CIRCULAR.*

At the regular meeting of the Executive Committee held August 5th, the following persons were accepted as members: Charles S. Freer, Emanuel Gattle, Michael S. Herzog, William C. Lippus, Thomas H. McCatchen, Louis Neresheimer, Louis Osswalt, and Benjamin Spier, all of New York City; George S. Magrath and William L. Elias, of Brooklyn, N. Y.; Fred. Van Buskirk, Collingwood, Ohio; Henry Moser, Wapakoneta, O.; J. W. Helfrick, Carrollton, O.; Max Forcheimer and L. J. Buchanan, Cleveland, O.; Henry Stagaman and Lee Loeb, Cincinnati, O.; Daniel Low, Salem, Mass.; Hobart P. Richards, North Attleboro, Mass.; Samuel Biggin, Taunton, Mass.; Geo. H. Eustis and Frank A. Holmes, Boston; Max Weinberg, C. S. Tirrell, William S. Fowler, and Leopold Eisenbach, Chicago; Rodney Pierce, Jr., Danville, Pa.; Oscar C. Ganter, Pittsburgh, Pa.; J. R. Davidson, Philadelphia, Pa.; Henry E. Osborn, Meriden, Conn.; Louis Schmitt, Providence, R. I.; George A. Cory, Newport, R. I.; Charles Hayes, Newark, N. J.; Peter J. Brees, Newark, N. J.; Bartholomew McClune, Kansas City, N. J.; Samuel H. Baynard, Wilmington, Del.; William Owen, Jr., Newport, Ky., a total of 37, making the membership at present 1381. At this meeting three applications were rejected and several tabled for further investigation.

The Secretary would remind the members again of the necessity of notifying him immediately of any change of address, and thus save the possible annoyance of being dropped from the roll for non-payment of assessments. The constitution provides that "a notice sent to the last address given shall be considered a legal notification;" the notice of assessment is sent out to the members as a circular, and if the member is not found at the address given, the circular is not returned to the Secretary by the Post Office authorities, and he is not therefore made aware of the non delivery of the notice.

The Secretary has now provided uniform blanks for change of beneficiaries, and will in future send them to any member who wishes to make a change.

The League is the recipient of a handsome gavel presented to it by Messrs. Simons Bro. & Co., of Philadelphia, at the last meeting of the committee. It (the gavel) is of silver-mounted ebony with suitable inscription.

The Secretary of the League in this column, March issue, acknowledged the receipt of a fifty-dollar United States Government bond as a donation by two members of the League toward the permanent fund, the interest of which is intended to decrease the frequency of assessments in future years. He immediately dipped his pen into the ink ready to acknowledge the receipt of the second donation, but his pen now lays idly by the inkstand, and his muscles grow soft for lack of that style of exercise. It may suggest the establishment of an appropriate gymnasium for him if we mention the fact that the Bank Clerks Association has in its last annual report, under the following heading:

"Honorary Members—Contributions of Fifty Dollars and upwards, constituting the donor an *Honorary Member* of the Association, without participating in its benefits, or having the right to vote" the names of 119 gentlemen, more or less prominent in banking, mercantile, and professional life, and the names also of 17 ladies (God bless them).

In the number of years the Bank Clerks Association has been established these names would indicate gifts of that character at the rate of more than twelve per year; the jewelry and kindred trades have as yet awakened but two who realize what a few dollars given

by a number of individuals each may accomplish in good done to fellow beings. What member of the trade who, upon looking back upon the business of the year sees an evident increase in his worth at the end of the year, will show his appreciation of the blessings bestowed upon him by investing a sum of money in the permanent fund of the Jewelers' League, where he may rest assured his money "will do the most good?"

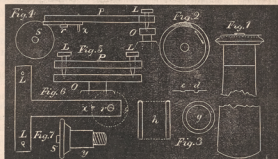
The Secretary awaits reply.

Every member has paid the recent assessment; a statement very creditable to the membership of the Jewelers' League.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH.

IN MY last communication I spoke of making cutters for cutting stem-winding wheels; this is very easily done when you have a charcoal tube for softening steel. Old bench files softened make good cutters. A cutter $\frac{5}{8}$ of an inch in diameter will do good work—even $\frac{1}{2}$ an inch will do. The simplest method of making cutters is as follows: Take a piece of softened file, cut and file out a disc of the size mentioned above, make a hole in it to fit the arbor of your cutting engine; file one side of the disc flat, let this go next the solid chuck of the cutting arbor. Put the arbor and disc into your lathe and turn the edge of the disc to the exact form of the tooth you wish to cut. Swiss watches are the ones oftenest required, and the teeth to these are usually shaped as shown at B, Fig. 1. After you have



the form correct, face off the back as shown at the dotted lines, and remove from the cutter arbor, and with a small wood screw, fasten the disc (we will now call it a cutter) to a wood handle, as shown at Fig. 1. Smear the cutter with oil and use a common graver to cut it full of lines in the direction of the arrow in Fig. 2; the lines should be quite fine, 12 or 13 to $\frac{1}{16}$ of an inch. You will find, by taking advantage of the direction, straight lines will run even across the curved. Cut the entire cutting surface of the cutter into lines, and so close that the spaces between the lines come to an edge—if you see a space which looks blank score it with a line. This system makes a good cutter (which cuts and rounds both) for the ordinary shaped tooth, by notching or filing teeth into the square edge. To harden use the charcoal box or some of the anti-scaled compounds—castile soap made into a thick paste and smeared all over the cutter will protect it; heat it to a pale red and plunge edgewise into cold water. This dipping edgewise prevents warping or springing. After hardening the cutter is ready for use—needs no running down. When using your cutter keep it constantly oiled, and it cuts very smooth and will need but little polishing to remove cutter marks. Of course the reader will know that the pieces of steel which are intended for stem wind wheels must be softened in the charcoal box. The methods of finishing stem wind wheels are but indifferently understood in this country, and, indeed, every factory has a way of its own. I will give here processes which will, if carried out, produce good results. The finish of wheels under the dial—I speak with reference particularly to Swiss watches—is merely ground with oil-stone dust (sometimes polished); this style of finish needs no description here. The style of finish I mean is on the exposed wheels, and

consists of dull, granulated look on the wheel, with a polished groove and a polished beveled edge to the teeth. The granulated surface is generally called frosted, and to get this finish we will suppose that we have just cut a wheel and wish to finish in this way. The working face of the teeth has all the cutter marks ground out with oil-stone dust and oil applied by the edge of a piece of sheet metal shaped to the tooth. The next is to harden the wheel; this is done by protecting the wheel and proceeding as described above for the cutter, but the wheel must be run down to a spring temper, and the back side brought down to a dead flat by filing and grinding on a ground glass slab, either with emery or oil-stone dust, the first cutting much the most rapid. The wheel should now be screwed to a flat faced chuck and the face turned true and flat. The groove should now be turned in with a round pointed tool; there is a point to be noticed in doing this, let the groove be sharp at the place the curve meets the flat face, ϵ is it should be, ϵ is not; this shape enables the shellac to protect the polished surface of the groove when the process of frosting is going on. Oil or wet the round pointed tool to make it cut smoother. To polish out the groove a hollow cylinder of zinc or block tin is used as shown at Fig. 3; A is longitudinal section, ϵ an end view; the cylinder is about $\frac{1}{2}$ an inch long, and the ends turn to fit the groove as shown at A . There should be two of these, one to grind with and one to polish. Oil-stone dust and oil is applied to the edge and held into the groove until all tool marks are out, when the wheel should be washed with soap and water, when cylinder number two should be applied with diamantine and alcohol until a brilliant polish is obtained. The polished bevel edges of the teeth are produced with special machinery, but a fair substitute is shown in Figs. 4, 5, 6 and 7. **A** shaped piece goes into the socket for the tool rest of any foot lathe, this piece is shown at a , the top of this **T** parallel with the lathe spindle; another **T** shaped piece is shown at P , this piece has two screws, Z , L , which fit into guide pits in a , see Fig. 5. The stem wind wheel to have its teeth beveled is fastened to the piece P by a screw at r , Fig. 4; i is a tin lap which goes on a screw arbor to the lathe, and shown at Fig. 7. The edge of the tin lap, s , is shaped to the tooth, and is used with oil-stone dust or emery as described for the groove. After grinding the bevels the wheel must be carefully washed, and another lap substituted for s , and used with diamantine and alcohol. The stem wind wheel is held in place by the screw, r , and a pin, x , goes into a tooth to hold it while grinding. To shift it take out x , turn one tooth and put in x ; repeat until finished grinding or polishing.

After the groove and teeth are polished paint over the wheel with gum shellac dissolved in alcohol, dry and heat on a metal plate until plate will hiss sharp. The next operation is finishing the flat face of the wheel by frosting. As directed, the face of the wheel now is flat and smooth, with polished groove and teeth bevels; the whole covered with a coat of shellac. Now wash your ground glass with soap and water. Tie up a spoonful of dry oil-stone dust in a piece of fine India mull or muslin, and dust some through the cloth on the glass by striking the bag on the edge of a ruler or something similar; add 8 or 10 drops of water to the oil-stone dust, and commence to grind the face of your wheel with *oil-stone dust and water*, go short, round motions, crossing and turning, bear on but *very light*, and keep plenty of water on the glass; the shellac on the face will very soon be off, and a granular look make its appearance. A little practice with old, large size steel ratchets will learn you how; the process is a very simple one, but to get the hang of the right quantity of water and the proper degree of pressure requires practice. A much better grain and a whiter and more silvery look can be obtained by sifting on fine mastic and heating as described for brass, only using a weaker acid and the finest muslin to be obtained. The process will need repeating at least 4 times. The shellac should be preserved in the groove and on the polished bevels, as this, in a great measure, in the grinding process, prevents the oil-stone dust from injuring the polish; and in the acid process the shellac will be left intact, for the turpentine used to remove the mastic will not touch shellac. Alcohol will take the shellac off. The acid will leave the surface of the steel almost black; to remove this use sulphuric acid with 8 parts water. If you should still wish to whiten the look take an old watch oil bottle and grind the bottom with sand or emery on your ground glass slab until flat; with this grind some diamantine until perfectly fine, add alcohol, and rub the surface of your wheel with it applied with the end of the finger. There is no process which will produce a finer granulated or frosted appearance on steel than the one last described; the first does very well, and corresponds to three-fifths of the jobs.

The Detached-Lever Escapement.

BY M. GROSSMANN.

A COMPLETE lever escapement is composed of and contains two distinct actions: 1. The action of the wheel and pallet; 2. The action of the lever or fork and rollers. These two actions are produced each by two acting parts, so that the numbers in those parts in the lever escapement is four. They are: the wheel, the pallet, the lever, and the rollers.

The wheel is flat, its teeth projecting in its own plane. The teeth are of various shapes, corresponding to the way in which the lifting is performed, and vary from a sharp-pointed form to a full inclined plane. The wheel is mounted upon the escape pinion, by which it is connected with the work.

The pallet is also of very different shape and proportions. In most cases its body lies in a tangential direction to the circle of the wheel, and shows on its extremities two projecting parts directed toward the wheel teeth, on which the action of these latter take place. These parts are called the *overs* of the pallet. In most cases the parts operated on by the wheel teeth are jeweled with hard stones, to provide for greater resistance against wearing. The pallet has a hole in its center by which it is fixed on the pallet axis or pallet staff, and moves with this axis.

The lever is a bar of metal, fitted by its holes on the pallet axis, and fastened at a certain angle to the longitudinal direction of the pallet. This angle is quite arbitrary, and depends entirely upon the intended arrangement of the escapement. If there are two arms of the lever, one of them serves merely to establish the equivoque, while the other is the acting arm. This latter has in the greater number of lever escapements a notch cut into its extremity, wherefore it has been called the fork.

The roller, in the ordinary construction of lever escapements, carries the impulse pin, commonly made of a ruby, working into the notch of the fork. It is a round disc, fitted by its center pole on the balance staff.

These four parts have three centers of motion, the pallet and lever moving together on the same axis. They are made in manifold ways, thus constituting an indefinite number of different lever escapements, the whole of which it would be a very tedious task to describe.

But as all these varieties result from different combinations of the various kinds of the two before-mentioned actions forming the lever escapement, and which, being entirely separate actions, may be combined in every possible way, it will simplify the treatment of the subject to establish a classification of these two actions, according to the various ways in which they take place, and then to explain what is required for their combination. Therefore, the various constructions of the lever escapement may be classified from two principal points of view: 1. With regard to the way in which the lifting of the wheel on the pallet takes place; 2. With regard to the means by which the impulse is transferred to the balance.

The action of wheel and pallet.—This action consists in an alternate lifting, imparting a small vibratory motion to the pallet, by the means of the diagonal driving plane on each arm of the pallet. This lifting is not permanent, because the two driving planes are interrupted by two places nearly concentric to the pallet center, so as to arrest or lock the wheel tooth dropping against them. By the interposing of these locking faces, the lifting of every tooth, ending with the drop of this tooth from the edge of the lifting plane on one pallet arm, is succeeded by the resting of the corresponding tooth on the locking face of the outer arm. There it remains locked until released by an action which shall be spoken of later.

The locking faces must have a slight deviation from the line adapted for the mere resting or locking of the wheel tooth. This deviation serves to produce a tendency of the pallet arm to be drawn farther toward the center of the wheel, thus securing the detachment of the vibrations of the balance, by preventing the pallet from leaving its position of rest by the slightest movement of the watch. This tendency of the locking faces is commonly called the "draw."

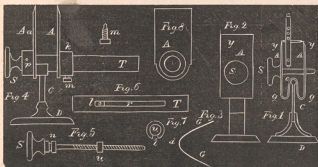
The lifting of the pallet, which constitutes the principal part of the wheel and pallet action, can be produced in three different ways: 1. The inclined planes being on the pallet, and the wheel teeth having a simply pointed form—ratchet teeth; 2. The inclined plane being on the wheel teeth, and the pallets presenting two thin pins or edges; 3. The inclined planes being partly on the pallet and partly on the wheel teeth—club teeth.

Lathes and Lathe Work.

BY THE MODEL WATCH MAKER.

"The best work is only produced by the best workmen with the best tools." Skill and good tools, as the above aphorism might be condensed, are generally found together; but as skill has to be acquired, and good tools to be purchased, it stands those in hand who are about to acquire one and purchase the other to understand where they can get the most for their time, and the best for their money.

In this series of articles the merits and demerits of the different styles (not makes) of lathes will be discussed, without fear or favor. All the new appliances will be described and the methods of using them, as well as the ordinary routine of lathe work. But the great effort of the writer will be to give to the young and aspiring workman such instructions as will enable him to produce work equal to any in accuracy and finish; and do it on the lathe to which he is accustomed, be that the turns (bow lathe), wax chuck, or American. The first great essential in lathe work (indeed in any mechanical effort) is ACCURACY, and this is only to be obtained by measurement. Fine and perfectly correct measuring tools is something sadly missing in many watch makers' collection of tools. Indeed it is only within the last few years that measuring tools of great accuracy has been brought to notice. Many watch makers repel the idea of measuring for a pivot or measuring a pivot and turning to exact sizes, saying their eyes are educated so well that they can tell perfectly without measurement; *quack* is the term for such men, for they not only do imperfect work themselves but countenance it in others. What would you say of a carpenter whom you wished to make a door for you who refused to measure the doorway, saying his eye was educated to that degree of accuracy that he could tell to the eighth of an inch the size of a door. No person would listen to such nonsense, and still it would be more reasonable than for a watch maker to contend that he could measure with his eye to the $\frac{1}{1000}$ of an inch; and this is not close measurement in watch making. Tools measuring $\frac{1}{1000}$ of an inch are used for all the small pivots; the best micrometer callipers measure such sizes as accurately as a carpenter's rule measures $\frac{1}{2}$ of an inch, and they (the callipers) will indicate much closer; but indicating and measuring is two things, although often confounded. The greatest use for excessive fine measurement that is closer than $\frac{1}{1000}$ is for testing pivots to see if they are round, and in this case an indicated $\frac{1}{1000}$ would be useful. We have another instrument for determining if pivots are round or not, and that is the *poising tool*, and as it is an indispensable adjunct to lathe work I will describe it. I presume most of my readers have one of these tools, but as I give a cut of a new and desirable pattern I hope no further apology will be necessary.



Figs. 1 and 2 show a poising tool of the simplest form; *A A'* are the jaws; these are made of a piece of French coil spring about $\frac{1}{2}$ an inch wide; the bends at *g* and *e* can be made without reducing the temper by bending, as at *G G*, Fig. 3; holding the point *d* in the flame of a lamp until it reaches a deep blue, making the bend while it is hot (in the flame in fact. Make the bend *e* first. The

holes for the screw, *S*, can be punched by placing a block of lead between the jaws, *A A'*, and using a flat faced punch of the right size. The base, *D*, and standard, *C*, are made of brass, and can be soldered to *A* at *e*. A more elaborate tool is shown at Fig. 4. This can be used for marine chronometers or the smallest watch. It is an elegant little tool, and an ornament to any one's bench. This has a small tube, *T*, for a bar, on which the loose jaw, *A*, slides by the screw, *S*. This jaw, *Aa*, is fixed by the pin, *p*, which serves the double purpose of securing the jaw, *Aa*, and holding the screw, *S*, in place by the notch, *n*, Fig. 5. The tube, *T*, has a slot on the lower side shown at *r*, Fig. 6. The nut, *u*, Fig. 6, is just large enough to slip easily into the tube, *T*. We will now suppose that the jaw, *Aa*, is put on the tube, *T*, and the screw, *S*, is put in as shown in Fig. 4, the pin, *p*, is put in; this jaw is now all right. At *i*, Figs. 6 and 7, is a small piece which fits the groove, *r*. The socket, *k*, slides on *T*; the screw, *m*, is tapped into *k*, passes through *i* into *u*, and thus enables the screw, *S*, to move the jaw, *A*. Fig. 8 shows the jaw, *A*, looking in the direction of the axis of the tube, *T*. The cuts are about $\frac{1}{2}$ the size of the instruments represented. The last described tool is quite easy to make; the tube, *T*, in fact all the parts, can be made of brass, except the jaws, *Aa*, screws, *S*, and *m*. The method of using these tools is shown in Fig. 1. The screw, *S*, is adjusted until the balance pivots will lie on the edge of the jaws, *y y*, as shown. Of course the reader will see that if a balance is the least out of poise the heavy side will turn down. How to put a balance in poise will be discussed in the proper place. To test pivots and find out if they are round with this instrument: After your balance seems perfectly in poise, take some delicate tool like a pivot brooch and revolve the balance by turning it about $\frac{1}{6}$ of a revolution at a time, letting the balance come to a perfect rest each time; if the pivots are not exactly round the balance will seem to have two or three heavy sides, or places where it will oscillate, or swing back and forth. To make such tests your poising tool must be in good order; the jaws, *y y*, must be almost to a cutting edge and perfectly smooth; they (the jaws) must have their edges level, and no air stirring in the room. With all these precautions the error of $\frac{1}{1000}$ of an inch can exist in the pivots and escape detection by this test. For this reason use your poising tool to poise your balances, and use your micrometer callipers for finding out if your pivots are round. We have several forms of micrometer callipers (Grosman's among the best), but one fault prevails with all, they are too large and too heavy. You will have to remove your work from the lathe to measure, which is especially inconvenient if using an American or wax chuck lathe. The writer invented and made, several years ago, a calliper weighing less than 10 dwts ($\frac{1}{2}$ oz.), entire length $1\frac{1}{2}$ inches, which measures to $\frac{1}{1000}$ of an inch; it can be applied to the finest pivot while in the lathe with perfect safety; can be used rapidly, and is in every way convenient. I have used one for 8 years and it needs no repairs. There are, to my knowledge, about a dozen in use, all giving excellent satisfaction. They are not for sale, but I will give cut and full directions for construction in my next communication. Any ingenious watch maker can easily make one. But whether he makes one (which I give him liberty to do) or not, I hold it imperative to possess one of some kind; for the idea of doing a first-class job of lathe work without one is absurd.

METALS may be rapidly colored by covering their surfaces with a thin layer of sulphuric acid. According to the thickness of the layer and the durability of its action there may be obtained tints of gold, copper, carmine, chestnut brown, clear aniline blue, and reddish white. These tints are all brilliant, and if care be taken to scour the metallic objects before treating them with the acid, the color will suffer nothing from the polishing.

A FRENCH inventor has improved India-rubber and gutta-percha by the addition of a distillate of birch bark, which, it is claimed, greatly increases the durability of the rubber, the new mixture not being acted upon by the air or by acids.

The Discrimination and Artistic Use of Precious Stones.

BY PROFESSOR A. H. CHURCH, F. C. S.

CONTINUED FROM PAGE 114.

IN pendants, and necklets, and locket, and brooches there is room for the expression of some definite and intelligible design. The mere alternation of rubies with diamonds in rows or checker work may, in some instances, achieve all that is needed. But a design of more definite form may often be preferable, especially where the stones at one's disposal are of differing colors and sizes. Then one may construct a suitable bit of leafage or flowerage, duly conventionalized, in accordance with the nature of the available materials, into forms of more or less geometrical severity. It should be noted that moonstones, and white sapphires, in which there often lurks a faint opalescence, accord well with rubies; but it must be kept in mind that the size of the colorless stones which are to be associated with rubies in such designs as those which I have named, is a matter of much moment. It is a mistake to attempt to match the colorless and the colored stones in respect of size, and generally of shape also. One should be smaller than the other. Large rubies with small moonstones, or small rubies with large moonstones, and similarly, square stones with round, and oblong stones with round, generally produce happier effects than square with square, and oblong with oblong. Pearls accord with rubies, not only by reason of their color relations, but also on account of their shape. In the case of rubies cut *en cabochon*, brilliant-cut or square step-cut diamonds will be found to yield very satisfactory combinations. A border of small brilliants or roses is a usual and a useful mode of setting off the qualities of a ruby. The color of a pale stone is heightened by contrast with the colorlessness of the diamonds; the richness of a rich stone is enriched, and a small stone, if surrounded by stones still smaller, becomes magnified in proportion.

Next to the ruby, amongst the red stones, comes the spinel or balais ruby, an entirely different mineral species, without any pleochroism, and inferior in hardness to the true ruby. The scarlet, aurora-red, and flame-colored spinels are the most beautiful; those which verge upon crimson, purple, and violet, looking dull and black at night, but showing very delicate and often rare hues by day. Red spinels accord well with small brilliants, or with larger pearls or moonstones. A fine aurora-red spinel looks well when surrounded with delicate foliage of white, orange, and black enamels. Step-cutting, similar to that employed for emeralds, accords best with the optical qualities of this stone. A biconvex lenticular form may be so adapted to this stone, as to throw a good deal of soft and rich color into a specimen which would otherwise have had little beauty to recommend it. What richness of hue the finer examples of red spinel may show is to be studied in two specimens in the Townshend collection, South Kensington Museum, Nos. 1,326 and 1,327.

From spinels the passage to garnets is easy. But it is not really difficult to discriminate between the two species, even when the colors seem the same. If you have a ruby, a spinel, and a garnet together, the first will scratch the second and the second the third. The ruby will show two colors in the dichroscope, the spinel and the garnet only one. The spinel will exhibit no black bands like those belonging to the red garnet, when viewed with the spectroscope. And there is a blackness, due to much absorption of light, in many of the facets of a garnet, as seen from the "table" of the stone, which will not be observed in the spinel! The garnet, unless of a remarkable size or quality, will hardly be deemed worthy of being mounted on the same costly way as the ruby or the red spinel, but it may be said that the same general treatment suits all these red stones. Yet there are two ways in which garnets have, for long and in many places, treated, to which I may legitimately refer here. The plates of been garnet so largely found in Anglo-Saxon and Celtic jewels have remained, in the majority of cases, intact to the present day. They afford, in their breadths of soft, rich color, a pleasant contrast to the minute flagee, granulated, and enamel work, with which they are generally

associated. The other employment of the red garnet (and it may be traced back to a far earlier date than that I have just cited) is as a carbuncle—not necessarily foiled at the back. Cut *en cabochon*, slightly hollowed behind, and laid on a plain gold surface, the light, as of a glowing coal, quivers in the midst of a good stone. There is a lovely disc of antique gold set with five carbuncles in the Gold Ornaments Room at the British Museum. There is a round carbuncle boss in the center; then four long pointed arms, like much elongated pears, radiate from this center, alternately with a somewhat similar series of *repoussé* arms, beaten up from the disc of gold, and bordered with nurlé wires onlaid. There is not much work in the piece; the intrinsic value of gold and garnets is quite small, but the effect is delightful; simple, yet rich; solid, yet elegant. Can the same praise be honestly given to modern garnet work? Can we feel a genuine satisfaction either in the design, the execution, or the effect of a compound big carbuncle of eight lobes, with a six-rayed star riveted into the midst of it, the aforesaid star being of hard, poor, glittering, much alloyed gold, and containing a number of irregular fragments of defective diamonds? The star soon gets loose, and, later on, the diamonds begin dropping out. But I will not pursue the history of the piece any farther, and I will refrain from calling your attention to other obnoxious modes of using the carbuncles say, in a ring with a sham gold knot on either side.

Amongst orange and yellow stones I would, unhesitatingly, assign the first place to the yellow zircon—a stone which is sometimes found of a hue which may be aptly described as that of transparent gold. Next to this comes the cinnamon stone, or essonite; and then we may place the rich sherry-colored Brazilian topaz—that kind which yields, when heated, the finest rose pink stones. Yellow sapphires take an almost equal rank with the best topazes, and then the chrysoberyl follows, and, at some distance, the yellow beryl. Few color combinations have been attempted with these yellow stones; puce-colored spinels I have found to associate with the yellow sapphire very happily, but there are some enamels which answer equally well. Generally, a design of pale bluish-grey enamel, with minor details wrought in buff and white, develops the richness of gold colored stones.

There are two green stones about which something ought to be said—the emerald and the tourmaline. I do not sympathize with those persons who regard the green of the emerald as vulgar. It is too easy to construct a vulgar, coarse ornament out of emeralds, even if they be of fine quality; so much I will allow. But the emerald, step-cut, and judiciously and quietly mounted, possesses a rich and refreshing color, just sufficiently dichroic to show passages of bluish-green with the green. Green tourmalines are much more markedly dichroic, and it is much to be regretted that, with rare exceptions, the patrons of the jewelers' art still remain ignorant, not only of the peculiarly rich and varied qualities of the color of the tourmaline, but even of the existence of this gem-stone. With moonstones, or with grey and white enamel, long prismatic tourmalines, carefully cut, afford a delightful color-combination peculiarly fitted for larger pieces of personal adornment, such as pendants and brooches. The so-called green garnets of the Urals, especially those which are of an olive or pistachio green, are lustrous and fiery stones, but their softness precludes their use in rings. The same objection holds good with regard to the lovely stone, the peridot, but this species occurs frequently of large size, and is so well adapted for employment in jewels not subject to much attrition. It is a dichroic stone; it accords well with small puce, violet, or indigo spinels, also with black and white enamel.

Passing over, for lack of time, the varieties of beryl known as aquamarine, the green and blue beryl, the topaz, and the green sapphire, I must linger a few moments over the sapphire. The dichroism of this stone, strong though it is, does not appear much in the cut specimens we usually see. But I do not doubt that the twin beams of diversely-colored light which this stone transmits, one azure blue, the other greenish star, contribute to produce the peculiarly

rich quality of its velvety softness. There is a glittering coldness in all the imitations of the sapphire—the *timbre* of their color, if I may borrow a word from music, is harsh and unsatisfactory. So a recent imitation, a kind of lime-spinel made artificially, exhibits apparently the right color, but it is flat and uninteresting. To my eye, the difference between the true sapphire and a false one is the analogue of the difference between a piece of leafage in wrought iron, and the same piece in cast iron. As to the arrangement of the sapphire in jewelry, so much depends upon its depth of color and its precise hue, that a general rule would be fallacious. Unless it be pale, when certain green tourmalines go well with it, the sapphire may be most safely associated with pearls, diamonds, moonstones, or white topazes, the cutting and size of the stones being carefully studied.

I wish I had time to say something about the amethyst, both the violet quartz and the harder and infinitely rarer violet sapphire. But if I have been compelled to omit such observations, and many other things which I would gladly have included, I may, perhaps, entertain a reasonable hope that what I have found time and opportunity to introduce may stimulate the production, and the appreciation also, of new and choice color-combinations of precious stones, and may tend to a more lively and intelligent interest in those little-known and little-prized species, the jargon, the tourmaline, and the spinel.

Before concluding, I may be permitted to direct your attention to two matters of considerable importance in connection with this subject, if our interest is to be sustained, enlarged, and educated. I refer to collections of specimens of precious stones, and to books on the subject. You must go to public museums if you are to see a jargon or a tourmaline. With a very few exceptions, the largest and most noted London jewelers could not produce a single fine specimen of these curious stones, nor identify them if they were shown to them. I had five good stones mounted by a well-known goldsmith a few years ago, and he misnamed every one of them in the bill. Signor Giuliano, of 115 Piccadilly, is, indeed, the only artist-jeweler whom I know to have made a specialty of the judicious employment of these out-of-way stones.

I commend to your notice three collections of precious stones. In the Museum of Practical Geology, Jernyn street, there is small series amongst which the jargons (especially a green one) are particularly fine. In the Mineral Department of the British Museum, now at South Kensington, a most complete series of every kind of precious stone, distributed, however, in many cases according to their mineralogical position, will be found. And the South Kensington Museum itself owns a fine series of mounted precious stones, 178 in number, the bequest of the late Rev. Channey Hare Townshend. Unfortunately, the official catalogue (1877) of the Townshend collection contains more than twenty incorrect or doubtful attributions. But you will learn much from this series, if you will bear in mind the corrections which I made in this list, in a paper published in the *Spectator*, on July 6th, 1870, which I repeated in the *Quarterly Journal of Science* for January, 1871, and which were adopted by Mr. Hodder M. Westrop, in his compilation, published in 1874, and entitled a "Manual of Precious Stones." I will just give you a single instance of how misleading are the names affixed to some of the Townshend gems. On page 17 of the catalogue (last edition), Nos. 1306 and 1307, and those only, are described as hyacinths, jacinths, or zircons. Both are garnets, and so the Townshend collection would appear to include no representative of this interesting species. But this is not so. For Nos. 1281 and 1282, called garnets, are really zircons; so, probably, is No. 1305, which figures as a chrysolite; and there is a fourth characteristic specimen, No. 1322, labeled tourmaline. But if you make the corrections, and fourteen others, (Nos. 1184, 1188, 1192, 1194, 1195, 1277, 1290, 1297, 1298, 1299, 1304, 1309, 1312, and 1318), you may study the remainder of these specimens with satisfaction and confidence. In a neighboring case to the Townshend series there are some interesting specimens lent by the Right Hon. A. J. Beresford Hope. But here note that Nos. 60 and 61 are not jacinths, but garnets; that 42 is not a sapphire, but a bit of blue

glass worth 4d. or 6d.; that 53 is not an emerald, but a bit of green glass, though next to it is a veritable emerald, or rather two, carved into a vinaigrette; that No. 110, called an aquamarine, is actually a sapphire, and that No. 113 is a tourmaline, not an aquamarine. Of the many books written of late about precious stones, few have any claims to scientific exactness, or afford any satisfactory indication as to the artistic arrangement and use of precious stones. Many interesting facts and fancies about particular stones, and about their commercial aspects, are given in Mr. H. Emanuel's "Diamonds and Precious Stones" (1865); and more particularly in Mr. E. W. Streeter's "Precious Stones and Gems" (1877). But the little volume by M. Louis Dieulaufait, entitled "Diamants et Pierres Précieuses" (1871), which has been translated into English, commends itself on many accounts as the neatest, cheapest, and most trustworthy manual of the subject which has yet appeared. I venture to refer also to my own papers previously named, to one in vol. i. of the *Magazine of Art*, and to a paper in the *Proceedings of the Geologists' Association*, vol. v., No. 7.

In conclusion, I must ask you to pardon the omissions, and they are many, in this paper, in which a large subject had to be handled in a short time. And I must ask you, further, to pardon the imperfect and inadequate manner in which I have attempted to express the results of my own thought and work, in those sections of the subject upon I have found time to say something. If my paper serves in any way to stimulate and direct thought upon the artistic employment of precious stones, such a result will be as much as I could have hoped for, and more than I have warrant in expecting.—*Journal of the Society of Arts.*

On the Treatment of Silver Residues.

THERE are many jewelers and photographers who take very little care to turn to proper account the residues and wash-waters of their establishments, and though few will be found who entirely neglect the recovery of the silver from their waste solutions, there are cases where, partly through ignorance, partly from indolence, the silver residues are allowed to pass down the sink. And yet the work of recovering the silver is so simple and easy, that we can only wonder how anyone whose vocation must have made him familiar with chemical manipulations can wish to evade it. Generally the residue, in the shape of precipitated chloride, is sold to the dealer, and there can be no objection to this method if the precipitate has been separated in a pure state, for the honest dealer can then at once pronounce on its value. But if, as is so often the case, the precipitate consists of a wet and shiny mass of silver chloride, mixed with the dregs of the developing and fixing solutions, and often containing bits of paper and other offscouring of the laboratory, how is it possible for the dealer to form an idea of the value of the pure silver it contains? The separation of such a mixture costs time and money, and must be taken into account. Cleanliness and care are therefore of the greatest importance in any process for collecting the residues. For the reduction of the precipitates to metallic silver, the only reliable method is that by fusion. Reduction in the wet way can only be employed in the case of the chloride, and if a special galvanic apparatus is not used, the silver thus obtained is likely to contain impurities, especially zinc; hence it is preferable to resort in every case to fusion. For this process a tolerably large crucible must be used, and the reducing agent must be added in small quantities at intervals, waiting on each occasion until the reaction, which may be recognized by the mass frothing up, is complete. Any ordinary stove in which coke is burnt can be employed for this operation; when it is finished the crucible, after being allowed to grow cold, is broken, and the metallic silver will be found at the bottom in the form of a button.

So far, the manipulation of the silver residues presents no material difficulties, but the subsequent conversion of the metallic silver into the nitrate, especially the operations of evaporating the nitrate solution and the fusion of the resulting salt, are among the most disagree-

able proceedings which the photographer has to undertake. The fumes of nitric acid which are given off during the evaporation contain towards the ends of the process much nitrate of silver, and, spreading to a great distance, they cover all articles of furniture or other objects in the room with a number of small black spots. When the operator has adopted the bad habit of using his dark room as a laboratory, this visitation may produce incalculable mischief. After all, instead of the accustomed pure white silver nitrate, the operator will perhaps find he has a nasty dark mass, which has an acid reaction, and contains silver nitrite, the source of innumerable failures in the negative process. If, on the other hand, the silver nitrate be allowed to crystallize out without coming to the fusing point, a purer product will be obtained; but for an unpracticed chemist it is difficult to free the crystals completely from the mother liquor, much of the silver nitrate remaining in the latter, so that, after all, fusion has to be resorted to. For these reasons it is in every way better for the photographer who is not provided with all the conveniences of a well-furnished chemical laboratory, to confine himself to the production of metallic silver, which, as above explained, is not a difficult process; he will get a good price from the dealer, and is quit of the troublesome and anxious operation of reducing the metallic silver to the nitrate.

A point of material importance in this working up of the silver residues is the financial question, inasmuch as the profit is greater, the greater the quantity of material one has to deal with. Now, in the production of silver nitrate upon a large scale, it would be much too costly for the manufacturer to use fine silver only, as well as much too difficult to get this substance in sufficiently large quantities; he is compelled to have recourse to ordinary standard silver containing a certain portion of alloy. For the photographer who has not the necessary convenience and skill, the production of pure silver nitrate from metallic silver alloyed with copper is a work of great difficulty and troublesomeness, and not by any means worth his while. The relation of the price of fine silver to that of the nitrate varies, of course, with the market, but, as a general rule, is in the proportion of 15 to 12; assuming, therefore, that fine silver can be sold at its full value, we ought to get for each part of fine silver one and a quarter parts of nitrate. On the other hand, by the conversion of one part of fine silver we should get 1.57 parts of nitrate, the advantage, therefore, in conversion over the exchange being about one-third of the weight of the silver employed. When large quantities can be employed, this advantage becomes of importance, and if it were not for the difficulties and inconveniences alluded to, the conversion of his own silver into nitrate would be to the photographer a source of considerable profit. Any method, therefore, which does away with the disagreeable operations of converting metallic silver into the nitrate by means of evaporation and fusion will be welcome to the photographer. Such a method the author believes he has discovered; one by which, without trouble or loss of time, a perfectly pure and faultless product can be obtained.

By this method the production of the salt in a solid form is avoided, and the silver nitrate is obtained in a solution of which the degree of concentration is known. The quantity of solution which must be produced is easily calculated; a gramme of metallic silver corresponds to 1.57 grammes of the nitrate, so that a solution of the salt of the degree of concentration 1 : 10 contains, for every gramme of silver, 1.57 grammes of nitrate and 15.7 grammes of water. If the solution has a strength of 1 : 8, for every gramme of silver $8 \times 1.57 = 12.6$ grammes of water are required. Before commencing work, therefore, the metallic silver—obtained as chemically pure silver by the reduction process—must be weighed, and the weight in grammes must then be multiplied by 1.57, and also by the proportional number of the water in the degree of concentration, in order to get the corresponding quantity of solution. For instance, suppose that by the reduction process a button of silver of 136.4 grammes weight has been obtained, and that it is required to have a solution of the strength 1 : 11, the quantity of the solution to be produced will be

found by multiplying $136.4 \times 1.67 \times 11$, so that the volume of solution must be made up to (nearly) 2,356 cubic centimetres by the addition of distilled water. As we have to do in this process with very pure silver solution, we can, if desired, avoid the calculation by using an ordinary silver densimeter, sinking the instrument in the liquid, and adding water (stirring every time) until the required degree of dilution is obtained.

Now, to get a pure solution of silver nitrate, and, above all, one free from all acid, the button of metallic silver must first be dissolved in chemically pure nitric acid diluted with one-third or one-fourth of its volume of distilled water. This is best effected in a porcelain basin, heated over the flame of a gas-burner or spirit lamp, but never allowing the solution to reach the boiling point. It is advisable to carry out the operation in the open air, on account of red nitrous acid fumes being given off, which are hurtful to the lungs. Only a small quantity of acid should be used at a time, and so soon as the development of the red vapors has ceased, and the silver salt shows signs of crystallizing out, the liquid should be poured off into a glass vessel. Another small quantity of acid is then poured on the silver, and, as before, transferred to the glass beaker, the operation being repeated until the silver has disappeared. By this means not only is the silver dissolved in as short a time as possible, but the solution which has been collected in the beaker contains only the least possible excess of free acid.

We must now endeavor to neutralize this free acid. This is best effected by putting a small portion (about one-fifth) of the acid solution into another glass, and adding to it a solution of pure sodium carbonate, so long as a yellowish white precipitate is formed; an excess of the carbonate is not injurious. Stir it up with a glass rod, and add more of the carbonate until the solution has a decided alkaline reaction, by turning red litmus paper blue. Let the precipitate now settle, pour off the superincumbent liquid, and wash several times with distilled water. The precipitate is now for our purpose pure silver carbonate, for even if it contains infinitesimal quantities of sodium nitrate and carbonate, these substances will have no injurious effect on photographic operations.

Now pour the portion of the solution that remained in the beaker on the washed precipitate; carbonic acid gas will be given off with effervescence, and the silver carbonate is dissolved in the excess of nitric acid. If the whole of the carbonate is dissolved, there has not been enough precipitated in the first part of the operation, and the same process must be repeated with another small portion of the original solution. But if the proper proportion has been observed, there will remain a little of the carbonate precipitate still suspended in the liquid; this must be redissolved by carefully dropping in pure nitric acid, and the last trace of excess of that acid must be again neutralized by adding sodium carbonate in very small quantities until a very slight appearance of silver carbonate is produced, which does not vanish on shaking up or stirring the solution.

The solution thus obtained, if the directions above given have been carefully followed, contains nothing but chemically pure silver nitrate; it must be brought to the requisite degree of concentration by adding water as above described, and can now be at once used, if desired, for the positive bath. For the negative bath it must be first iodized and filtered, but no filtration is required in the case of the positive bath. Should the solution be at first too weak (though this is not likely to occur) it can be strengthened by adding a few crystals of silver nitrate. When it is to be kept for future use, it is better to have it in a concentrated condition, and it will be improved by keeping for some time in a warm place, so as to allow any free carbonic acid to escape, which is liable to form bubbles on glass plates and paper.

A correspondent of the *Deutsche Uhrm. Ztg.*, says he has used diamondine for the last sixteen years in the following manner: The article to be polished is first ground with a fine oilstone and afterwards with steel red, then cleaned in benzine. I put the diamondine on a piece of soft wood, give a few strokes with it, and quickly obtain a polish. The main point is to have the article well smoothed, and before using the diamondine, to immerse and clean it well in the benzine.

The Horological Exposition at Chaux-de-Fonds, Switzerland.

CHAUX-DE-FONDS, July 15, 1881.

The great event in horological circles of the year is the exhibition now in progress in this city, of horological works. Extensive preparations were made to have the Swiss watchmaking industry most thoroughly represented, and on no previous occasion have there been so many goods, made in this country, placed in competition. It is held under the auspices of the *Société d'Emulation Industrielle*, which was organized in 1878. After the magnificent display made at the Centennial Exposition in Philadelphia, in 1876, when Americans showed the world what progress they had made in making watches by machinery, it will be remembered that the Swiss Commissioners returned with such glowing reports of what they saw, that our horologists were greatly discouraged. Indeed, it was publicly, if not officially, declared that this great Swiss industry must be abandoned, and those who found employment in it would have to seek other means of earning a livelihood. But this discouragement did not last long, and, among other means employed to revive the waning interest in horological pursuits, was the organization of the society above named. The promoters of it have lost no opportunity to encourage those engaged in watchmaking, to introduce improved methods, and to restore confidence. The present exposition is one result of their labors, and, although there has been some jealousy exhibited between the great rival centers of the watch industry—Geneva, Locle, St. Imier and Chaux-de-Fonds—there cannot be a doubt but it will result in great good, not only to the horologists, but to Switzerland.

The following named gentlemen constitute the executive committee of the exposition, and to them is largely due the success which has attended: Fritz Perret, President; Paul Perret, Vice President; Edouard Steiner, Secretary; Arthur Richardet, Assistant Secretary; Henri Rickel, Cashier; Louis Mathey, Asst. Cashier; Auguste Ducommun, General Commissioner. The following named gentlemen are presidents of the committees: Ernest Bonjour, of Committee on Printing; Pierre Besançon, of Committee on Diplomas and Medals; Jacob Gutmann, of Committee on Installation; Edouard Bovey, of Committee on Admission of Machinery; Albert Vuille, of Committee on Admission of Horology; Albert Perret, of Committee on Surveillance; Henri Rickel, of Committee on Finances.

The Exposition opened July 1, in the halls of the Industrial College, and adjoining buildings. Not only is there a superb display of watches of every variety, but also of tools and implements used in the business of watchmaking. These exhibits indicate that the horologists of Switzerland profited by their experience at Philadelphia, for wonderful improvement is shown in all branches. The exhibitors of watches and special parts of watches number 241, and, in addition to these, there are 100 exhibitors of machinery and tools. Nearly every manufacturer in the country is represented by examples of his best products. The exhibits are arranged in three large halls, each 100 feet long by 30 feet wide, the space being all taken. This will give some idea of the quantity of goods exhibited. It is the most complete collection of Swiss horological products ever assembled anywhere, and would be a credit to any nation. I shall not attempt to give you the list of exhibitors, for many of them are wholly unknown in America, nor shall I attempt to draw any comparisons between the exhibits of the different manufacturers; it will be time enough to be more specific in this respect when the awards of the various committees are made known. Suffice it to say, generally, that this Exposition comprises all that is known in the science of horology. Some of the watches here exhibited are simply the perfection of the watchmaker's art as now understood—nothing better has ever been made, and it will be long before they are improved upon in material points. As timekeepers they are as nearly perfect as possible, while in form, styles and material they leave little to be desired. In the matter of cases, wonderful ingenuity is displayed, especially in the way of enameling. Some of the cases are gems of art in this respect,

and would be treasured for the rare beauty of the effects produced in enamel, if for no other reason. In the decoration of cases, the Swiss lead the world. As the watch is such a useful and necessary article and susceptible of being made highly ornamental, it seems to me to be a desirable thing to go a step farther and make the cases beautiful art studies, thus combining the aesthetic with utility.

In watchmaking machinery and tools, the Swiss have made wonderful progress of late years, but they are still far behind the Americans in this respect. In one respect Switzerland is far ahead of America, as she possesses seven horological schools. I have alluded above to the jealousy exhibited by some of the manufacturers. I might better say that it is the jealousy of these different horological schools. There is a rivalry between them that begets considerable feeling, as each has its champions. While there is a strife between them that is to be regretted, it doubtless adds to the interest taken in the science of horology, and leads to improvement. Still, harmonious action would, probably, accomplish more. A brief description of these different horological schools will, no doubt, prove of interest.

The school at Geneva was founded in 1826, by the *Société des Arts*. It was turned over to the city authorities in 1842, under whose administration it has been since then. It has received very few legacies, but is supported by the municipality at an expenditure of 48,000 francs annually. Tuition amounts to only 4,000 francs, and a sum of 44,000 is yearly paid by the municipality toward its maintenance. The price of tuition is five francs for natives, twenty francs for strangers, and children of residents, at their request, can obtain a diminution of price. The severe crisis threatened for a long time to close its doors, but the municipality voted to sustain it as long as possible, hoping for better times.

The school at Chaux-de-Fonds was opened in 1865. Its general expenses have risen from 10,000 to 20,000 francs yearly, which are supplied as follows: By monthly dues, by the revenue of capital dedicated to it; by a municipal subvention; by a grant from the state; the Bureau de Contrôle, when its finances are in a prosperous state, yearly vote 500 francs to it; M. L. T. Ducommun Sandoz habitually honored it with a gift of 600 francs. Tuition was lowered from 25 to 12 francs monthly. This reduction is only for Swiss and strangers whose parents reside in Switzerland.

The school at Locle opened in 1868. The cost of maintenance amounts to about 24,500 francs per annum. The expenses are covered by: Fees for tuition; help of the state; also of the municipality; also by the Bureau de Contrôle; the interest on an inalienable capital destined for tuition for poor children; a charitable lady, the widow of Henri Moser, pays for schooling one pupil. Tuition is fixed at 30 francs per month, and 50 francs for the class in regulating, if the pupil has not passed though an entire course. Strangers pay an entrance fee of 100 francs.

The school of St. Imier was opened in 1866. Its expenses are 13,300 francs. Receipts: From the state, 5,500 francs; from the municipality, 2,000 francs; from pupils, 5,800 francs. Price of tuition 250 francs per year, payable monthly; this is increased if the pupil does not desire a whole course, to 400 francs. Strangers and natives enjoy the same rights.

The Bienné school has been in operation since 1871. Tuition 25 francs per month, alike to strangers and natives.

The school at Fleurier was established in 1875. Its expenses are 7,050 francs, which is defrayed by the pupils, state, and community. Tuition, 15 francs per month to natives and strangers residing in the locality, but from 20 to 25 francs per month for strangers who come simply for apprenticeship.

At Chaux-de-Fonds is the School of Art. The authorities had for a long time entertained the pet scheme of permitting this industry to share in the excellent courses of drawing taught by special masters in the primary schools and industrial classes. But the first practical idea to open a special school of applied arts dates to the under-

taking of the Society of Employing Engravers. A commission to investigate this question, in 1870, presented an interesting report embodying the germ of the present School of Art. The chairman of the committee, M. Numa Droz, to-day President of the Confederation, presented most clearly the great importance of drawing, as applied to horology, and the decoration of the watch. "Industry is both a necessity and a luxury," he said, "horology must combine at once the perfection of mechanical means with all the resources of artistic application." The school was opened in 1872, under favorable auspices. The course is entirely gratuitous, the pupils are admitted at the age of thirteen, and are required to possess a knowledge of the first principles: straight and curved lines, with applications to figures and geometrical solids. Examinations take place each six months; lessons, the first five evenings of the week. The number of pupils is growing steadily, and, to-day, 180 are enrolled.

These several schools have done much to develop the science of horology, and their influence is felt in every workshop in the world. They also made possible the present Exposition wherein the horological art exhibits the finest products of which it is capable. As you will be interested in the final results of the Exposition, I promise to write you again. The only American dealer I have seen here is Max Freund, of New York, who manifested great interest in this really wonderful exhibition.

THE CITY OF CHAUX-DE-FONDS.

In connection with this subject a brief description of the city of Chaux-de-Fonds and its industries will not be amiss. The town which has the honor of sheltering the National Exhibition of 1881 is situated in one of the highest valleys of the Jura, a thousand metres in altitude. Little favored by climate, the grand industrial and commercial city is the seat of an industry which spreads in all directions, to a great extent; it has for its tributaries all the civilized people of the globe without exception. It is barely two centuries since La Chaux-de-Fonds, a village lost amidst forests, barely counted one thousand inhabitants; to-day its population is 23,000 souls. This astonishing prosperity, this singular growth, especially during the last thirty years, is due to the development of the horological industry, but more especially to the inventive spirit, to the energetic character of its inhabitants. The immigrated population has gradually become assimilated with that already existing, and it may be freely said that the latter is truly both cosmopolitan and national.

For the establishment of numerous ways of communication and railroads, the mountain fastness is in daily communications with its neighbors, Locle, the cradle of horology, Les Brenets, La Sagne and Les Ponts, devoted to the same industry, as well as Le Val-de-Ruz, and especially Le Val-de-Travers. At Neuchâtel, in Vignoble, in general, are established a great number of manufacturers and workmen; it may truly be said that watchmaking has transformed the canton of Neuchâtel, by introducing into it a prosperity without equal. Railroads equally connect La Chaux-de-Fonds with Val-St-Imier, Franches-Montagnes, Bienne, Tramelan; with the industrial districts of Mouliez and Porrentruy, St. Croix, the Valley of Joux, in the canton Vaud—in a word, with all the districts peopled by watchmakers.

But the most brilliant star of this pleiades of a hundred towns, villages and hamlets, the inhabitants of which solely occupy themselves with horology, is La Chaux-de-Fonds. More than 200 manufacturers and traders busy themselves to find new markets in the two worlds whither to ship their wares and machinery. Factories, counting rooms, bureaux of purchase and sale, workshops, are present in abundance, and the exhibition of horological wares, tools and machinery, seen on the way from the depot to the center of the place, proclaims with a loud voice to the visitor and stranger that he finds himself in the very native place of the watch, and everything pertaining thereto.

At no distant day next year, the mountains of Neuchâtel will be

united to Besançon, thence to Paris, by a railroad, and France, whose suburban towns we are already, will be our near neighbor.

The horological productions of Chaux-de-Fonds are celebrated for their excellence. Its pocket and marine chronometers, costly, astronomical, and current watches are unequalled. Its commercial transactions are thus facilitated that but few towns of equal importance possess a greater number of banks and discounting houses, offering favorable conditions to the fabricant and his correspondents. To encourage work, and enterprises born of intelligence, is the task imposed upon themselves by the twelve establishments of this kind, at present in full activity at the place.

Assisted by particularly favorable circumstances, under the protection of a Republican constitution and laws, the municipal authorities have been able to erect works and buildings of great interest, at the same time an honor to La Chaux-de-Fonds; notwithstanding the immense expenses it incurred, in common with other localities of the canton, in building the first railroad connecting the mountain with other regions of the country, the industrial city has yet by no means neglected to give to its places of instruction the necessary development. Numerous primary schools, an industrial school, art school, horological school—these are the bright flowers which embellish its crown. Its magnificent colleges blazon forth as the monuments of activity and intelligence of a population which has sown in order that it might abundantly reap.

La Chaux-de-Fonds has become changed during the latter part of this century; it was nearly demolished by fire in 1793, and has since been entirely rebuilt, and wide, spacious modern streets run in all directions, while the dwelling-houses are commodious. With its commodious public building, newly erected by the state, its colleges, among which the large and splendid Industrial College, the seat of the present National Horological Exposition, its temples, its coquetish houses, Chaux-de-Fonds, seen from the neighboring heights, impresses the stranger and traveler most favorably.

Work, persevering and assiduous work, is the agent that wrought this change. The present generation is benefitting by the labors of the past, while, in turn, it is preparing that for the future.

What has been said here, may with equal justice, be said of other localities of the country which an energetic and diligent population has caused to prosper. This especially applies to Locle. It appears that progress has its domain in the mountains, in the valleys of the Jura, and on the banks of its lake. May the people of Neuchâtel persevere in their work; their prosperity is an honor to Switzerland—their beloved fatherland.

KNICKERBOCKER.

A Faulty New Spring Stop-Work.

THE purpose of the stop-work is, as is well known, to protect especially the inner end of the main spring, being most exposed on account of its small coils, from breaking. An ill-advised new-fangled idea has sprung up for the last few years to keep from putting in the stop-work by fastening, or better keep from fastening, the outer spring end, and it has been called spring stop-work, to gloss over the want of such an one; but this contrivance will never replace the time-honored one. It is done thus: A short piece is riveted to the outer end, which is calculated to catch in three or four grooves made inside the barrel rim. Should it slide out of one, the next one would retain it, etc., whereby an over-winding of the spring is sought to be obviated.

The writer has experienced, however, that this jumping out also takes place during the running down of the spring, regardless of the time of winding. Such a watch was returned to me as not going; I wore, to test it, and then discovered the fault. I would advise any repairer who gets such a watch, to provide the spring with a hook, as this is the only way to radically remove the fault.



Guide for Watchmakers's Apprentices.

BY HERMANN SIEVERT.

[Continued from page 158.]

Inspecting a Clock.—There are actually only two conditions to which a clockwork is subjected, to render faultless service. First, every wheel must run free, and, second, the depthings must be in order. You know what the latter condition signifies; by the free motion of the wheels is understood that its pivots do not cramp in their holes, and that the wheels do not rub on any parts or against each other. A friction may take place, when a wheel touches the plate, or when two wheels approach too close together and interfere with each other's motion. Such easily produced or already established frictions will be noticed by you before taking the clock apart, and you will remember the defect so as to remedy it in your repairs.

If occupied with a spring clock, let the spring run down, before taking it into pieces, by lifting out the click, and, securing the arbor with the key, let it slowly slide back. If the click cannot be reached, the clock must run down, for which purpose you will remove the anchor, taking care that the escape wheel teeth do not knock against it when removing. To prevent such an occurrence, it is well to secure the wheelwork with a cleaning wood, before taking it out.

Having taken the clock into pieces, our next duty is to correct and remedy any faulty pivots, together with thin shoulders, and to bring them in order. The center wheel, to be found in the center of the wheelwork, and making one revolution per hour, of course, must have a thicker pivot, because the minute work is placed upon its prolongation. In pendulum clocks, other than small mantelpiece clocks, the center wheel is connected with two other wheels, the third and the escape wheel. The latter and the center wheel generally retain their motion centers unchanged. When required, therefore, you will first of all bush their holes. Each wheel is afterward singly placed within the plates and the four pins inserted. The arbor of the wheel must have sufficient, but not too much shake, between the plates (end-shake). Moreover, the pivot must have a little visible side-shake, to exclude any cramping. The wheel, in such a condition, can move free within its holes. Any friction, or the possibility of such an occurrence, noticed heretofore, will cause you when bushing the holes, to give the wheel in question a trifle more end-shake on the one than on the other side. Any running out of true level of a wheel must be corrected by suitably bending the shanks.

Before bushing, if necessary, the holes for the third wheel, we first examine the depthings, and to do this, we place together two wheels. A hole drilled through the place on a suitable spot will facilitate the observation of such depthing, but a practiced touch will also be found of good service. The driving wheel is propelled slowly in its proper direction, under an observation, and the pinion is retained somewhat on its arbor. If now the engagement of wheel-tooth and pinion leaf occurs too early, you will be able to feel the jar produced, by feeling a knock of more or less intensity. Although you will feel such a one when the depthing is placed too deep, and the wheel drops forward, but with the former the dropping of the wheel occurs first, and by a little practice you will soon learn to distinguish the two defects from each other, without being able to see the depthing. However, it is better, and more secure, when you can follow the motion with your eye. Extend the examination to the shake, which must be present, and it should be tried in different positions of the wheel, to be secure. In passably good clocks, wheel and pinion will be so conditioned and stand in such proportions, that where but little shake is present, the depthing will be found too deep, and the reverse, by too great an amount of shake the depthing is too shallow. Supposing such errors are discovered upon inspection, you will enlarge the holes, before bushing, with a round file toward the offending side. Considerable practice is necessary to thus determine the amount of removal of the holes, that they shall be in their right places after bushing, and operate, upon re-inspection, with satisfac-

tory results. If you have a depthing tool at your disposition, when engaged in this work, large enough to accommodate the wheels, you will proceed with more safety. The depthings are simply placed right in the tool, and after having entirely closed the holes of the third wheel, locate them anew by describing circles upon the plates. At the place where the two circles intersect each other, mark the hole to be drilled. The wheels must fit lightly in the tool, and the holes in the plates be drilled truly vertical, that the depthing shall become corresponding as you have placed it in the tool.

Although defects in the form of the teeth and proportions of size of wheels and pinion are easier presented when manufacturing, than they can be corrected afterward; when repairing we find in common clocks, nevertheless, both wheels and pinions which will never render a good depthing. No other tool stands at our disposal, when correcting tooth forms of large clocks, than the file, which must be manipulated by the hand. This is productive of two evils, where a use has become necessary. First, even the finest file is unable to smooth the tooth roundings, and second, even the most expert hand cannot produce a perfect regularity. Consequently, a file is only made use of when a wheel is really bad, and a passably good depthing cannot be obtained by any other means, and then great care and caution becomes necessary. Before attempting such correction, it is well to practice for some time on old and useless wheels.

The first and unavoidable occasion for filing the teeth is when a wheel is not truly round, which condition has not arisen by a bending of the arbor or other easily rectified cause. The error must be corrected in such a case, but where not possible, the wheel has to be turned. This operation is done in the lathe with a smoothing file, which is kept in a fixed position upon the support. Place the latter of a height to keep the file almost horizontal, when attacking the wheel. The encounter must occur very gradually, so that only the longest teeth are engaged first, until at last even the shortest receive a trace of the file, a sign, if it was kept firm, that the wheel is round. Should some of the teeth have become so short, that the spaces between them are too shallow, they must be deepened with a flat file which fits into them, down to a circle which we marked in the lathe upon one side of the wheel. The cutting and rounding is next in order, and you will follow the epicycloid form, such as was described in a previous number. This is a piece of work which permits of no haste or flagging of care and attention.

The error of a pinion being too small or too large, may be corrected within certain limits, by a corresponding form of tooth rounding. In the first case, make the tooth somewhat rounder, in the latter, somewhat more tapering.

An over-sized pinion may be made smaller sometimes, if its core, which forms the center of the leaf-spaces, be not too thick. The pinion is turned down, and the leaves are rounded again with a sharp graver, or, if it can be reached, with a file, or grinding and polishing tools. Further improvements of a pinion already assume the proportions of making a new one, and require the dismantling of the wheel and softening of the pinion, to work it to better advantage.

The center wheel in an eight-day clock is driven by the drum-wheel; in a one-day, with spring power, by the barrel spring. In an eight-day clock with spring, another wheel must be inserted, since the spring barrel cannot make as many revolutions as the drum wheel of an eight-day clock, which directly engages in the center pinion. Attend to putting in good condition in such clocks all pivots, holes, and depthings.

The shake of pivots in their holes of drum or barrel wheels must be scant; the depthings are apt to be exposed to trembling produced by double the amount of shake, first of the spring arbor in the plate, and next of the spring barrel upon the arbor. Consequently, all points which make no revolutions with the going of the clock, and only when being wound, need only sufficient side shake to keep from cramping.

The diameter of the core in pendulum clocks is generally one-third of the entire inner diameter of the barrel, sometimes a trifle less.

The thinner the core, the more revolutions will the spring cause the barrel to make, but the greater at the same time is the danger of snapping. The core hook should be situated somewhat in the center between the two barrel walls, and not be too broad, so as to force the spring to one side. To test it, draw on the spring somewhat with the key, and you should be able to move the core slightly, as a sign that no cramping or binding occurs. Neither should it be too high, not much higher than the thickness of the spring, to prevent a pressure of the succeeding coil upon it. An unhooking of the spring is obviated by diagonally filing the hook from below.

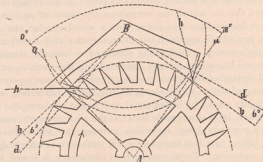
The unwound spring places itself against the inner barrel wall, and occupies about one-sixth of the inner diameter. The thinner the spring and the shorter it is, up to a certain limit, the more revolutions it will cause the barrel to make. If a spring fills the barrel, we must examine whether it permits the necessary number of revolutions—a calculation easily made. If not, and the spring is of satisfactory thickness, it has to be shortened. If the hook in the barrel wall permits the spring to slip off, it must be removed and a new one inserted. The operation of cutting out is done by chiseling off smooth, so as not have any old remains occupying the place of the spring; we lay the barrel flat upon the bench, use a sharp instrument and cut off with slight taps of the hammer. The next hook hole must not be too large, else the hook would not be retained in the thin wall. We next cut a thread in the hole, also one upon a tapering steel pin. The pin point must for a short length be without thread. Having separated the pin behind the thread, we insert its point from the inside through the hole, and screw it backward, up to the place where it remains firm. We note place and side, and there file the hook after having withdrawn the pin. It must retain the spring securely, and at the same time must not reach too far into the barrel. We then insert and tighten the hook again, and file off the outer projecting end nicely and smoothly. The hook may also be inserted from the outside, and it is well in such a case to drill the hole obliquely, against the operating force of the spring. It facilitates the work, and you may satisfy yourself of the practicality of both methods by trials.

Having thus inspected the clickwork, and, if required, shortened the click, corrected any occurring defects, and sufficiently weakened the spring, our next attention is to be bestowed upon the minute work.

The *Minute Work* consists of three wheels and one pinion. Upon the outwardly prolonged pivot sits the canon pinion, which carries upon its outer extremity the minute hand; owing to the occasional setting to which it is exposed, it must move with a soft friction upon the pivot. This is best attained by filing the canon flat upon two sides, until the hole is visible, and thus are produced two separate tube walls, which, when pressed upon, act with a spring power. The hole may be somewhat large by such a contrivance, and the canon fit loosely upon the pivot, these springs will nevertheless retain it sufficiently, so that the hand does not lag and is easily moveable at the same time. The two faces thus filed on must only go sufficiently far, however, so that the canon retains on both ends a part of its full circumference. The hour wheel is intended to move upon the canon pinion. A connection between the two is produced by the minute wheel with pinion, the first of which engages in the canon pinion, and the latter into the hour wheel. Minute wheel and canon pinion generally are equally large; in such a case, the pinion must have twelve times less teeth than the hour wheel, because, with its hour hand, it turns twelve times slower than the canon pinion. The first should be provided with epicycloid-form leaves, as it drives the wheel. If you bestow a little thought upon the subject, you will find that this will produce a very slender rounding. Not much, however, depends on the correct form of these depthings, and a pinion is chosen a trifle larger than the wheel, which sufficiently compensates the incorrectness of the increased rounding. These depthings are all-sufficient, as long as they do not cramp and lock, since no actual transmission of power takes place through them.

The *Escapement*.—We next come to the most important part of the

clock—the escapement, and we will bestow our attention at first upon the escapement found in common clocks, of anchor and escape wheel. The anchor consists of two lever arms, which carry on their ends fittingly formed faces. Since the scape teeth operate on oblique faces, they remove alternately the lever arms from the wheel. As both these arms are of one piece, the opposed arm end approaches the wheel at each motion. The anchor, together with its motion center, the anchor arbor, thus moves within the segment of a circle. A study of the accompanying cut will explain to you the manner and conditions.



The lever arms alternately stop the motion of the escape wheel, and prevent it from running down. As already explained, when treating of the clickwork, such a center motion is produced in the direction of a tangent. Consequently if the lever arms are placed in the tangential line, a small amount of pressure only is brought to bear upon the pivots of the anchor arbor. Any unnecessary pressure exerted upon these pivots is tantamount to so much uselessly wasted power. If in spite of this axiom, you will find the lever arms in common clocks within or without this line, you may conclude that ignorance of the principle caused it; these clocks generally have a great excess of power, which compensates the defect.

We first describe the outer periphery of the wheel, and then determine over how many teeth the anchor is intended to span. The one-fifth part of a circle is best adapted, which, by a wheel of thirty teeth, would give us six; of course, the one-half space between two teeth must be added, because when one pallet lies against a tooth, the other one must enter between. Thus the anchor will span over $6\frac{1}{2}$ teeth. The distance from one tooth to the other in a wheel of thirty teeth amounts to 12° , and for $6\frac{1}{2}$ teeth is equal to 78° . We mark this upon the circle drawn, and note from the center of the wheel *A* the amount by the lines *aa*. Where these lines cut the circle, we draw at right angles therewith, or in a tangential direction, the lines *bb*, and established at their point of intersection the motion center of the anchor *B*.

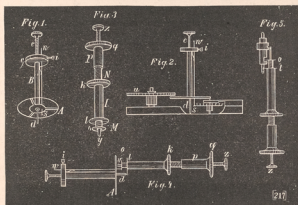
When the anchor makes one motion to and fro, the wheel will turn one tooth, or 12° , farther. This makes for both pallets 6° motion of the wheel. From this deduct $\frac{1}{5}$ for the thickness of tooth points, and for the drop, that is, for the necessary free motion of the wheel, after leaving the pallet, $\frac{1}{5} = \frac{1}{5}$, as the entire amount to be deducted, and we have left for the grasp of the pallets, $\frac{1}{5}$ of the 6° , or $4\frac{1}{5}^\circ$. This distance we mark upon the circle drawn in equal parts upon both sides of the lines *aa*, and describe from the point so found from the center of the anchor *B* two circles, which indicate the extent of the operating parts of the pallets of the lower arms. Next, we must determine how many degrees lifting the anchor is intended to have. Let us take it at 6° , and draw in this angle the lines *cc* to the lines *CC*. Through points, where these lines intersect with the two circles is the direction of the pallets established by the lines *hh*. The wheel moves in the direction of the arrow. The inner circle establishes the limit of the pallet at the entrance arm (left), where the inner drop must occur. The outer circle indicates the end of the pallet at the exit arm, where the outer drop of the wheel takes place. The trifling free motion of the wheel is permitted on account of security, that by a small irregularity of the wheel the anchor should not place itself upon the tooth. This free motion is called the inner and outer wheel drop; it should be of equal amount at both arms.

To be Continued.

New Measuring Tools.

FOR ASCERTAINING THE CYLINDER HEIGHTS.

THE first contrivance, Fig. 1, is intended to measure the height of the balance over the lower jewel hole, as well as the height of the scape-wheel arms. *A* represents the balance, of mean diameter, adapted for both small and large watches. This balance is fastened upon a small tube *B*. In this tube is placed arbor *c*, fastened below *A*, and is screwed in the tube *B* for the length of a few screw threads, for easier motion. Above *B* is a small brass disc *e*, soldered to tube *B*, and through which goes a thin arbor *w*, which also passes through the temporary balance at *i*, as near as possible to tube



B. Between the arbor and the tube is placed a spring retaining arbor *w* with a gentle friction, and at the circumference of the disc *e*, at the side *w*, is located the screw *i*, which in certain cases is screwed down, to prevent arbor *w*, while handling the tool, from displacing.

The first tool is very handy to ascertain heights, but it would not be very easy to transport by this instrument alone the measure upon the cylinder, wherefore Mr. Foulon has contrived its complement in tool Fig. 3.

I is a tube, provided inside with a few screw threads, to prevent too great a resistance when screwing; *k* is a milled knob, closely connected with *I*, and intended to be turned between the fingers; *l* is a very thin, easily turned steel disc, riveted to *I*.

Another tube, *MN*, provided with screw threads to be turned inside of *I*, carries at its lower end a very thin small steel disc, resembling *l*, only thinner. At the upper end *N* of the tube is another and shorter one, ending in the milled knob. It is closely connected with the tube *NM*, and must be united with it above *N*, either by mechanical fastening or by being soldered. Arbor *sz*, which is also provided with screw thread, goes through the entire center of the apparatus, and is corresponding to *c* d in Fig. 1.

Fig. 2 represents that part of the watch plate which carries the scape-wheel, its bridge, and the center wheel. Place the tool of Fig. 1 in the manner indicated in Fig. 2; the temporary balance is placed between the center wheel and the scape-wheel bridge, and the end of arbor *d* rests upon the jewel hole of the lower cylinder bridge. This shows, by the balance revolving upon the arbor *cd*, what height the real balance should have; arbor *w* is then slid down until its shoulder *S* corresponds to the wheel height, and it is thereupon securely tightened by means of the screw *i*, to prevent displacement. Thus the watchmaker possesses the measures for the balance height as well as for the cylinder incision where the wheel passes.

Fig. 3 is then taken, both shoulders are united, as in Fig. 4, by taking the tool of Fig. 1 in the left, that of Fig. 3 in the right hand. Revolve the screw of arbor *sz* until its point *y* supports itself on the balance *A* of the tool, and the first disc *o* also touches the shoulder of the wire *w*. Finally insert disc *l*, taking the milled knob *k* in the left and that of *g* in the right hand, and revolving the screws of tube *lk* until disc *l* touches the point of arbor *d*, while the point of arbor *sz* is braced on the balance. The exact measures have thus been obtained.

The only thing necessary now is to take a cylinder in the left hand, see Fig. 5, the tool of Fig. 3 in the right, and to compare both parts by placing together. While disc *o* occupies its place in the little cylinder cut, the place is indicated at the same time where the balance shoulder must begin, and at *l*, where the pivot incline has to be turned.—M. Foulon, *Revue Chronometrique*.

The Wedding Ring.

THE following article is from the pen of the humorous writer of the *New York Times*. What he says is good, but the article is superficial. He might have made capital out of the quality of the goods sold as wedding rings. His forbearance in this respect entitles him to the consideration of the trade:

"There is manifested in some parts of the West a desire to abolish the wedding-ring. This is not strange. The wedding-ring has been a fruitful source of woes unnumbered, which any heavenly goddess might sing with great applause should she feel so disposed. Tales of the utmost horror have been told of bridegrooms, who, at the moment when the clergyman pauses for the ring to be produced, cannot find it. Nothing has ever shown half so much skill in self-concealment as the wedding-ring. It will hide in the corner of a waistcoat pocket in such a way as to defy discovery, and it will transport itself from one pocket to another, thus compelling the bridegroom to ransack every one of thirteen distinct pockets. Nervous men—and who is not nervous when personally undergoing the marriage ceremony?—frequently drop the wedding-ring on the church floor, where it will roll the entire length of the building to conceal itself in some inaccessible crack. Sometimes it finds or makes a hole in the pocket, by means of which it penetrates into the interior of the bridegroom's clothing, and even into his boots; so that it is quite a common occurrence for the wedding to be interrupted while the bridegroom retires behind the pulpit and devotes half an hour to searching for the ring and to getting his boots on again.

As men are notoriously married in new boots, and as a new boot when once removed cannot always be dragged on again without the boot-hooks, the wedding guests are sometimes treated to the spectacle of a bridegroom going through the last half of a ceremony with one boot in its proper place and the other held in his left hand. There was a time when the carful western man always kept the ring in his mouth until the clergyman called for it, but this custom has now fallen into disuse. Fastidious clergymen and brides who had contracted the conventional ideas of the East, objected to the use of a warm, moist ring. Moreover, in his embarrassment, the bridegroom often failed to distinguish between the ring and his tobacco, and found, when it was too late, that he had—that is to say, that the ring was missing. Then, too, there were several unfortunate bridegrooms who unintentionally swallowed wedding rings, and thus laid themselves open to misconstruction. There was one man, reported to be of misery habits, who, doubtless inadvertently swallowed a wedding-ring known to be of considerable value, and choked to death in the process. This would naturally have seriously inconvenienced the bride had not her brothers—two practical men—been present. With great presence of mind the brothers removed the choked bridegroom to the rear of the church where they removed the ring with their hunting knives, and, pressing an eligible young man into the service, enabled their sorrowing sister to be happily married after a delay of only ten minutes. Still, one instance like this does not compensate for the many cases in which swallowed rings have produced suffering and inconvenience.

"The freedom of divorce which prevails in many of our States must inevitably render the wedding-ring unpopular. Every time a wife is divorced she naturally wishes to take off her ring—that is to say, is made small enough to remain safely on the finger, it is very apt to become so tight at the end of two or three months of matrimonial felicity that it cannot be removed. Hence, with a view to contingencies, the Illinois wife always has her ring made several sizes too large for her and keeps it in place with a smaller ring, technically known as the guard-ring.

The wedding-ring is a survival of the period when marriage was held to be a permanent, and was supposed to be a stern duration. Now that we have rejected this belief and hold that marriage is a business affair, a temporary partnership, the impropriety of clinging to the symbolic ring is manifest. In the place of it the Western reformers now propose to substitute a neat and inexpensive bracelet made so as to admit of a dozen modifications of pattern, and thus suited to be used half a dozen different times. It is to be placed on the bride's wrist the day before the wedding, so as to avoid all chance of being mislaid, and the wedding service is to be changed in such a way that instead of mentioning the ring, the clergyman will merely refer to 'the bracelet annexed to the bride and marked Exhibit A'. Being provided with a clasp the bride can take the bracelet off at any time, and as it is not very valuable intrinsically, the husband is saved from the temptation of melting it down and selling it the week after marriage. It seems as if this admirable substitute for the wedding-ring would meet all reasonable demands, and we may expect to see it universally adopted throughout the west at a very early day.

Workshop Notes.

AN ALLOY which has a fine appearance after coloring is made as follows: For 18-karat, 18 gold, 3 silver, 3 copper; 15-karat, 15 gold, 3 silver, 6 copper.

MANY watchmakers make use of a knife when taking out the balance spring; a piece of rod steel, about two mm. thick and ten mm. long, filed on one side in the shape of a knife with corners rounded down is easier and better to manipulate.

TO REMOVE the lustrelessness of gilt clock-cases, dead silverwork, etc., dissolve one oz. of cyanide of potash in one quart pure water, empty it into a bottle, and label it "poison." If to be used, place the article into an earthen vessel, cover it over with the solution, and the lustreless appearance will be removed in five minutes. Preserve the fluid for future use.

A SPRING may be laid flat and its temper drawn between two plates fastened together by a screw through the center, and placed upon the annealing plate. A small piece of whitened steel is laid upon it, to enable the operator to judge of the degree of heat. Before opening, let it cool. When drawing the temper, lay the coils farther apart.

L'Art et l'Industrie says, the name of *stifline* is given to an article which in its appearance recalls the article of caoutchouc, sold under the name of erasing rubber. It is composed of a mixture of caoutchouc and emery, ground into fine dust, moulded into tablets, and cut into convenient shapes. It removes the rust from steel or iron in the "twinkling of an eye."

Balance Spring Table.—A round plate of brass of about 22 mm. in diameter and one mm. in thickness, stands upon four small feet, about 10 mm. high, flat on top, and provided with nine small holes, for the reception as well of cylinder as anchor and chronometer balance springs, and to offer facilities of turning them upon it. This little table is greatly preferable to the riveting tool, commonly made use of for this purpose.

TO SPEEDILY make ivory flexible, immerse it in a solution of phosphoric acid (specific weight 1.13) until it partly or entirely loses its opacity; then wash it in pure cold water and dry. In this condition it becomes as flexible as leather, but gradually hardens when exposed to dry air. An immersion in hot water also destroys its softness and flexibility. The following method also may be used: Lay the ivory in three ounces of nitric acid, diluted with fifteen ounces of water. The ivory will be soft in three or four days.

A KEY for turning the spring coil upon the balance is made as follows: A steel arbor, provided with a handle of suitable length, ends in a cone at its end, into which a hole is driven and provided with a wing, filed sharp below. The balance is placed upon the little table above spoken of. Place with the right hand the little instrument upon it in such a manner that the balance pivot enters the hole, and the little knife is inserted into the cut of the collet, which thus may easily be moved until the stud occupies its hole exactly.

TO QUICKLY clean pinback watchchains, brass plates, dust caps, wheels, or other brass parts of a clock or regulator, Mr. Morgossy recommends the use of about $\frac{1}{2}$ deciliter of acetic acid, or strong wine vinegar, mixed with a spoonful of salt, put into a plate or other flat vessel. Immerse the article, let it remain in it about five minutes, if a chain, long enough to soften the dirt, then take it out and rub it between the hands; keep doing this until thoroughly clean, and it will become bright as when new; then rinse in cold water and dry with cloth or saw dust. Dirty wheels or other watch part can simply be dampened with the mixture and brush with chalk.

THE balance spring is best placed upon a piece of glass, not too thick, which lies upon a piece of white paper, whereby the disturbing shadow is prevented altogether. Much twisting of the spring is injurious, and no exact regulating can be had with a bent one. Should the occasion ever arise that the repairer has to weaken an overstrong spring, for want of another one, let him do as follows: Cut a middling hard holly marrow flat, press the spring carefully within it, lay it upon a plate of glass, and apply the oilstone with gentle pressure, or coarse red and oil, and thus remove as much as consistent. When much has to be taken off, it is better to shellac the spring upon the plate for flat grinding and polishing; of course, set the screws very exactly to obtain a uniformity; after finishing, remove the spring by alcohol, and boil. The spring coils must lie in their natural position, neither twisted nor cramped. I wish to state in this connection that this desperate remedy should only be used when the repairer has no other means at command, and only then in watches of low grade—of two evils choose the lesser—the spring is not improved by such a treatment.

CHINESE CEMENT.—Take clean glass, powder it very fine and pass it through a silken sieve. Rub this on a marble slab with the white of an egg, and add glass to thicken sufficiently. It is an extremely tenacious cement, and the parts will never separate again. Good for porcelain, glass, &c.

To Test the Exactness of Different Tools.—The Drilling Tool.—First try the point in the lathe, whether it runs truly straight and round; see that the points are well centered, and then fasten a screw ring upon it, one which may be slid with ease, and with which you may control the sliding of the point into the turn of the machine. Now mount the point with the ring in its place in the tool, and fasten at the end which protrudes below, a roll, to which a piece of soft brass wire is fastened to serve as index; bend it until its point very nearly touches the disc rim, almost scraping against it. Next revolve the point, and you may be assured that it stands at right angles to the plane, if the index end during the entire revolution remains at equal distance from the disc. Repeat this test several times, bringing the point each time into another position. **The Uprighting Tool.**—If the two shells, or tubes, in which is fastened the uprighting points, stand exactly opposite to each other, a closing fitting point, which is either pushed simultaneously through both, or is inserted into both, may with facility be pushed to and fro. The extreme points which are caused to approach each other at different heights, and placed opposite each other, must undeviatingly point one to the other, whether they remain at rest or revolve. Next take each separate point and test with it in the same manner as has been given for the drilling tool, the plane of the disc. Finally, place a brass arbor between the two points, which is further united with a brass wire index. While one point is prevented from further penetrating by a series of screw ring or roll with screw, and retained, the other is revolved, and in its revolution carries along the brass arbor, whose index, while touching on the disc plane, at once betrays any irregularities. Repeat this test, while varying the position of the points and bending the index to different places. If during the different trials the index point has remained in unvarying proximity to the disc, it is a proof that the tool works correctly. The uprighting tool consists, as is easily seen, of two main parts, the disc, to which the shell for the lower point is fastened, and the frame, which is fastened upon it with mathematical exactness, secured by screws, and which receives the upper point. Should any irregularities of a trifling deviation show themselves, the defect may be remedied by an underlay of foil or cardboard, between the lower and upper parts; where they are of any magnitude, however, the tool had best be sent back to the manufacturer for correction. **The Drilling Tool.**—The virtue of a deeping chiefly depends upon the absolute control not to permit the engagement of tooth and leaf to take place deeper than is permissible by theoretical laws; therefore it is of the utmost importance that the tool which serves for the purpose of indicating the distance of centers of the engaging arbors be of the utmost exactness. First satisfy yourself that the pin, which serves as axis of motion of the joints of the two halves, does not turn or change its position, is this pin is not truly straight, or a part of the joint is badly rubbed up, or otherwise had a bad hole, it might easily occur that the parallelism of the two halves is disturbed. The points, which must be of uniform thickness throughout, must without difficulty slide from one hole into the opposite one. These points, whose extremities have been found in a faultless condition, are next tested in the turning tool, until satisfied that they run exactly and undeviatingly true. Then replace them and cause them to approach each other (the opposite ones) point to point. The points must never cross each other in the various positions, regardless if they are fastened by their screws, or merely loosely inserted. It occurs sometimes with badly made fastening screws that the brooches or points will spring or bend when the screws are tightened, and as a natural consequence, the extremities will point at random. Finally draw a circle with the two parallel points, which are placed in at a uniform height, upon a smoothed brass plate, by taking a previously determined point as center; do this with different point lengths starting with a small projection and nearly all drawn out; do it also the reverse way. It is self-evident, and unconditionally necessary that the tool stand truly vertical to the plate in these tests of describing circles. Draw them thus that one laps over the other, to facilitate an observation of any deviation or correctness. When the test is finished, examining the points that they contain no lint or dirt, or whether they are so weak that they spring by the drawing of circles, you will know what value you may set on the tool, whether it is perfect or demands improvements. The latter consist of two remedies: To open the joints, rectify the opposite points, and to rectify the tool. The intelligent watchmaker will know how to remedy any trifling defect; he who has not the sufficient confidence in his ability, had better send the tool to the manufacturer.

Foreign Gossip.

Franz Von Uchatius, the well-known inventor of steel bronze, committed suicide on June 5.

Our Italian exchanges say that the Fair originally intended for 1884 has been postponed for 1886.

The *Revue Chronométrique* states that the Minister for the Marine and Colonies has awarded the first prize of 1,200 frs. to M. Leroy, for the best chronometer, exhibited by him, for the year 1880.

Besançon, the great French center of horology, manufactured, in 1880, 146,047 gold, and 267,783 silver watches, a total of 413,832.

Efforts are being made by the watchmakers of the continent to reduce the sizes of their mainsprings to some sensible, well-understood standard. As heretofore, every spring factory followed its own whim in the matter.

Superb glove buttons are worn in Paris, used like cuff buttons, and serve to guard against the annoyance of bursting off the ordinary button. They are set with precious stones, such as garnets or cats-eyes and turquoise.

The *Journ. Suisse d'Horlog.* states that the United States yearly consume 50,000 gross of watch crystals. It says that incredible as it may appear when compared to home consumption, it knows of one American firm which alone imports 35,000 gross.

A correspondent of the *Journ. Suisse d'Horl.* asks if it is not possible to make all watches and parts according to well defined calibers, as is done in America, instead of the present homogenous sizes? It will not be many years until Europe will follow us in this respect.

Switzerland—Greece and Turkey excepted, is the only country in Europe which, in this the year of grace, 1881, possesses no patent laws. The columns of its periodicals are crowded with the complaints of inventors whose brain labor has been pirated in a wantonly and shameful manner.

Watch fairs are still continued to be held in Biel, Switzerland, every Tuesday, and the newspapers there proclaim it as an undertaking crowned with eminent success. The *Schw. Uhrm. Ztg.*, of July 27, devotes a large space of its columns to the publishing of Statutes and By-Laws governing these fairs.

We see, by the answer of a correspondent to a question, asking for elucidation, that silver watch cases exported to France must be 500-1000 fine in all their different parts; by stem winders, the push button and canon also. Non-compliance with this law is punished by disfiguring the cases and returning.

A watch fair was held at Biel, Switzerland, commencing on the 1st day of March, and lasting one week. Buyers from Germany, France, Italy, England and other countries attended, and the *Schw. Uhrm. Ztg.* speaks in high terms of its success. It expresses a desire for another one, to be held at no distant day.

It has been calculated that Europe produced about 4 millions of watches per year. It is estimated that of the 350 millions of inhabitants of Europe about 34 millions wear watches, and, on the average, a new watch is bought every ten years, thus the yearly consumption for Europe alone, in normal times, would be about 3 1/2 millions; the remainder goes to foreign countries.

The jewelers and watchmakers of Germany have formed into a league, defensive and offensive, for the protection of their trade, wholesale and retail. The trade organs are agitating at present the adoption of some price equivalent, by letters or signs, such as is used by merchants, whereby the prying outside world may be prevented from getting an insight into the prices of the trade.

"Do not look a gift horse in the mouth," is a saying as old as the language, which applies with equal force to prize medals of lesser expositions. A French jeweler, by the name of Couturier, last year at a county exhibition, received a prize "gold" medal, for the good quality of his wares. The unhappy recipient undoubtedly invited all his cousins and his aunts, for a general jollification over the event. When, however, he applied it to the touchstone, to see if it was up to standard, he found to his chagrin that the bauble was simply of copper, and thinly gilt. This was more than our honest jeweler could stand, (all jewelers are honest), and he forthwith sued the committee. The court decided that Couturier had been voted a gold, not a copper, medal, and was entitled to receive such a one. We do not know what most to admire, the unqualified amount of cheek of the prize jury in trying to palm off copper for gold on a goldsmith, or his own good fortune.

Russia has lately adopted a new tariff, regulating the importation of watch movements and cases; the former at the rate of 65 kopecks, the latter according to quality.

The *Journal de Yura* reports a miscarried piece of rascality, which met with its deserved reward. A watchmaking firm of Chaux-de-Fond, Switzerland, filled an order for a Bulgarian house to the amount of about 10,000 frs., simply declared the value at 3,500 frs., but insured it by an insurance company for 160,000 frs., and sent it by mail. It then paid 30,000 frs. to a mail official to cause the box to disappear. Payment on the part of the company was protested, and several mail officials were charged with the theft and taken up. The guilty official at last, prompted by conscience, confessed the whole, and the head of the firm was taken prisoner and suit instituted against him. It is needless to add that the box also reappeared.

The March number of the *Revue Chronométrique* contains a lengthy article by Mr. A. Buisson on the Auxiliarily Compensated Balance Wheel, invented by our esteemed neighbor Mr. Heinrich. The article states its many advantages and speaks in very laudatory terms of the compensation. We sincerely wish Mr. Heinrich full success with his ingenious invention. The same paper mentions exhibitions held every Thursday and Sunday at the Conservatoire des Arts et Métiers, attracting the entire industrial class of Paris. A certain number of inventions, recognized as useful to the masses, are exposed within the Conservatory halls, and the inventors may experiment with them before the public. Vast crowds visit every Sunday.

The ancients of Greece and Rome used for a writing and drawing surface the abacus, a contrivance resembling a checker board, which was covered with dust or fine blue sand, into which figures and letters were written. Abacus or pulvis, the board and the dust, or sand, and the stilus, were the constant companions of the *savon* of antiquity. An interesting anecdote is transmitted to us of the renowned scholar, Archimedes, who, when forcibly removed from his work by the devoted servants, continued his mathematical problems even in the bath, by writing with the fingers upon his oily body. Let us imagine him with abacus or pulvis in hand, at the conquest of Syracuse, by the Romans, when one of the soldiers approached too near, he exclaimed: "Man, do not destroy my circles!"

Great efforts are being made in Shanghai, China, for a World's Fair, to be held there in 1883, after the pattern of that of Melbourne and Sidney. To this daring undertaking might be opposed the fact that, unlike the latter two Australian cities, Shanghai possesses only a small number of European inhabitants, but the organizers of the scheme are of the opinion that European and American manufacturers are becoming daily more impressed with the magnitude of the Chinese market. Both Europe and America do not as yet fully comprehend the necessities of the Chinese, and these latter have not the remotest idea how many thousand different articles those countries can produce, and from this point of view a World's Fair would simply tend to open up a stupendous market for both hemispheres.

The Chief of the Marine Observatory at Hamburg has issued a circular inviting all watchmakers of the Empire of Germany and Switzerland to forward to the Imperial Marine Observatory at Hamburg chronometers, not to exceed six, for public competition, and not later than the latter part of September. The chronometers will be tested from October 3, 1881, until April 11, 1882—for a period of 180 days—and in intervals of ten days each, will be submitted to the different tests for temperature, etc., ranging on the centigrade scale from about five to thirty degrees. The Imperial Admiralty purposes purchasing at least four, and will pay for the first class chronometers a price of 1,500, for second class, 1,200, and for the next two best, 1,000 marks. Should the Admiralty see fit to purchase others, it will pay the sum of 900 marks, leaving the sale at the option of the manufacturer.

A regulator, to be presented to their Royal Highnesses the Prince William of Prussia and the Princess Victoria of Schleswig Holstein, a betrothed pair, was exposed for inspection last February at Baden. The plan for this *chef d'œuvre* was drawn by Prof. G. Kachel, and executed under the superintendence of F. Pecher, clock manufacturer. The style of the clock unites our present art industrial status with that of the *renaissance*. The case is of American black walnut, and bears upon its front, crown like, the intercalated monograms in gold of the august couple; below this is a decorated frieze with the date and year of marriage. The dial plate is richly ornamented, gold plated, with the figures of silver set upon black ground. Upon the highly embellished door is painted an angel bearing the coat-of-arms of the pair, and is said to be a master piece in itself. Below this is the traditional Prussian heraldic eagle, of dead-gilt metal, in "pierced" work, through which the oscillations of the pendulum may be seen. The dedication is at the base, niello engraving upon a gold ground.

Degen, born in 1756, at Vienna, was an able watchmaker. He obtained the greatest fame, however, in his fruitless endeavors to construct flying machines. He made his first sally from the top of the Stephaus steeple; the wings could not support the weight of the apparatus together with his own, and he fell down, injuring himself severely. He persisted, and connected with it a small balloon, and succeeded at last. He went to Paris in 1813, where his trials, owing to contrary winds, failed entirely. He returned to Vienna, impoverished, and died.

The Commission appointed under the Federal law which regulates the control and guarantee of the quantity of gold and silver articles manufactured within the territory of the Swiss Confederation has lately held its sittings in Berne, under the Presidency of the Federal Councillor, M. Ruchonnet. It has resolved that gold of 18 carats fineness shall be stamped with the figure of Helvetia, while those of 14 carat shall be marked with a chamois head. Silver articles of 0.875 of fineness will have a squirrel for mark of quality, while those having only 0.8 of fineness will be marked with a woodcock.

In the eleventh and twelfth verses of the second chapter of Genesis will be found the following important information: "The name of the first is Pison; that it is which compasseth the whole land of Havilah, where there is gold, and the gold of that land is good." The Chicago *Inter-Ocean* states with apparent seriousness that a company of London gentlemen who have neither followed Ingersoll nor the scientists into their loose Bible notions, have organized themselves into a company to test the truth of the above sacred assurance, and that the stock of the "Havilah" gold mine has actually been placed on the London market, the proprietors announcing it to be the richest in the world, and the passage from Genesis is quoted as proof of it from an inspired source.

Le Grelot, a comic journal, has an anecdote about Gambetta, which was related to a member of its staff by the influential and somewhat eccentric Sir John Bennett, of Cheshire, who furnishes chronometers to the British navy. When Gambetta was residing in the Chausse d'Antin, Sir John called on him to express his admiration for his genius and sympathy for the illustrious tribune, and to crave permission to present a substantial token of both sentiments. Gambetta was "willing." Sir John asked whether it should be a ring or a chronometer. "A ring," said the great orator, "because when I wear it, it will be often before my eyes." "Good!" quoth his visitor, "and now for the motto?" "*Voulez-est pouvoir*," replied Gambetta. Sir John asked him to write it down—a request at once complied with. But the lapidary to whom the task of engraving the stone set in the ring was intrusted, only saw the first and last words of the dictum. When Sir John received the ring he found on the signet only "*Voulez pouvoir*." He consulted by letter the French tribune to know whether the error should be corrected. Gambetta wrote back that it should not, the engraving as it stood being very dull. "*Voulez-est pouvoir*," means, "To will is to be able." "*Voulez pouvoir*," is, "I pant power." Sir John Bennett's signet ring is daily worn by the President of the Chamber. I repeat the anecdote because I know it to be true, it having, in Sir John Bennett's name, presented the signet ring to Gambetta, and been present at the interview in which the motto was written by him for the worshipful maker of chronometers in Cheshire.

In antiquity, gold was abundant enough, and yet a pound of gold was worth rather less than it is now, say thirteen or thirteen and one-half times a pound of silver. In the Middle Ages there was hardly any production of gold at all, and still it loses much of its value, for it is hardly worth more than ten times its weight in silver. After the discovery of America, at first it is gold which flows in, and yet it increases in value so as to be worth eleven and eleven and one-half times silver, instead of ten times, as in the Middle Ages. The production of silver rises from 53,000,000 to 75,000,000 of marks between 1661 and 1790, and all the time the value of silver does not go down. From 1600 to 1790 the production of silver falls from 75,000,000 to 60,000,000, while that of gold rises from 20,000,000 to 25,000,000. Gold ought to have gone up and silver to have gone down; exactly the contrary of this is what took place. During the eighteenth century the production of silver is tripled, and yet its value, which ought to have gone down, goes up, and if it falls from 1875, it is because the ratio of one to fifteen and a half, which Calonne established in France, increased the legal tariffication of gold. During the nineteenth century, a fact more conclusive still, gold is produced in ten-fold annual quantity between 1840 and 1860, without any effect on its value. According to the Indian Memorandum there must have been in the world in 1860, 15,557,539 pounds of gold, and 330,828,926 of silver; and in 1868, 29,809,724 of gold, and 480,306,080 of silver. The mass of gold doubled; that of silver remains stationary, and nevertheless gold loses none of its value. These figures prove beyond refutation the error of those who make the relative value of precious metals depend on production; it is solely the effect of the law; as I have proved elsewhere. The French Minister of 1863, M. Gaudin, has summed all this up in a sentence. "The price of the precious metals in commerce always regulates itself according to the price of gold at the Mint."—EMILE DE LARAYE, in *Fortnightly Review*.

Business Notes.

L. Hammel & Co. have established a spectacle factory in Europe. G. W. Marquardt has removed the wholesale department of his business to Des Moines, Iowa.

L. & M. Kahn & Co. present a very attractive line of watches, diamonds and real and imitation stones.

M. Zineman & Bro., importers of watch and clock materials, tools, etc., of Philadelphia, have removed from 708 to 714 Chestnut street. Simons & Rogalsky have formed a co-partnership and opened an office at No. 36 Maiden Lane as wholesale dealers in watches and jewelry.

H. C. Haskell has just issued a very handsome illustrated catalogue of rings, which will be sent upon application to the legitimate jewelry trade.

Frantz & Opitz, of New Orleans have removed to the corner of Royal and Bienville streets, where they have fitted up a commodious and attractive store.

Albert Losch, one of the most enterprising of our importers, returned from Europe a few days since. The novelties he accumulated while abroad must be seen to be appreciated.

Messrs. F. I. Marcy & Co., manufacturers of the celebrated Acme Lever Cuff Buttons, have been compelled, in consequence of increasing business, to increase their manufacturing facilities.

John A. Riley & Co. have introduced, among other novelties this season, a black enameled bracelet, made in various unique designs, provided with their patent spring, which cannot fail to become popular.

F. Kroeber has recently received an extensive invoice of French clocks, embracing all the latest and newest designs and styles. Many of them present entirely new effects in marble decoration and other styles of ornamentation.

Joseph F. Chatelier is making a very attractive line of novelties in Rhine-stone goods, embracing combs, buckles, bracelets, etc., illustrations of a few of which may be seen in his advertisement, to which the attention of the trade is invited.

C. H. Knights & Co., of Chicago, are getting out a neat new catalogue of plated ware for the fall trade, which they expect to get into the hands of the trade about September 15. This work contains the latest styles in all makes of goods.

The co-partnership heretofore existing between G. W. and J. D. Ludwig, under the firm name of G. W. Ludwig & Co., Chambersburg, Pa., has been dissolved by mutual consent. G. W. Ludwig, one of the most enterprising young men in the state, will continue the business in his own name.

Kossuth Marx & Co. are making large sales of diamond rings, the diamond being so mounted that it is detachable and readily transformed into a shirt stud, or a lace pin, earring, or made serviceable in a variety of ways. It makes a useful ornament, as one diamond can be made to do duty for an entire family.

Specimens of the product of the North Carolina Emerald Mines may be seen at the office of the Morse Diamond Cutting Company, No. 192 Broadway, where a few samples may also be purchased. These specimens are of special interest to mineralogists and the trade in general, being, in fact, an addition to the list of precious stones.

The Waterbury Watch Company, manufacturers of the celebrated Waterbury watch, have opened an office at No. 4 Maiden Lane, in charge of George Merritt. Mr. Merritt is an excellent business man, a gentleman, and an indefatigable worker, in whose hands the interests of the company are sure to be advanced.

Wm. M. Fisher & Co., manufacturers of jewelry, are the makers of an interchangeable necklace, which can be worn either as a simple chain, or with pendants, which are furnished in a variety of patterns. Indeed, the chain and pendants are susceptible of a half a dozen changes, furnishing breastpin, locket, neckchain, bracelet, etc. It is novel and elegant, and will, no doubt, become popular.

Messrs. Simpson, Hall, Miller & Co., the well known manufacturers of silver-plated ware, have been awarded by the management of the Melbourne (Australia) International Exposition, the highest awards and medals for their exhibit of silver plated ware. The award consisted of an elaborately illuminated parchment certificate and a first prize medal. This honor is all the more gratifying considering the fact that the goods exhibited by them were in competition with forty-four of the leading manufacturers of the world; embracing such houses as Jas. Dixon & Sons, Walker & Hall, and Christofle & Co.

Trade Gossip.

Aug. Saltzman has been awarded a medal by the management of the Chaux-de-Fonds Exposition.

Rubies, diamonds and sapphires are worn in combination, in lace pins, finger and earrings.

The new designs in diamond goods were never more beautiful and varied than those offered this season.

The residence of H. D. Sherrill, in Lexington avenue was recently broken into and robbed of considerable property.

Chicago expects to double its population through the present low rates. All the gay low-farinos are heading that way.

A. H. Miller, of Chicago, has made an assignment for the benefit of his creditors and the lawyers who will settle his affairs.

Judging from the vast quantities of diamonds imported this season, the dealers anticipate a larger trade than ever before.

Hehrank & Bros.' jewelry store at Wheeling, W. Va., was destroyed by fire on the afternoon of August 21; insurance unknown.

In the temporary absence of the proprietor, Mulligan's jewelry store at Atlantic City was robbed of \$4,000 worth of jewelry.

Japhet Cross, who for thirty years has kept a jewelry store at Adrian, Mich., has failed, with liabilities of \$15,000; assets \$9,000.

Messrs. J. A. Riley & Co. have commenced suit against alleged infringers of their patented bracelet, and the chances are that some of them will wish they had never learned the business.

We practice and admire economy, but when a baldheaded watchmaker pulls out his wife's hair and uses it to tighten a canon pinion, he steps just beyond the boundary line of our admiration.

The jewelers of Newark are as busy as they can possibly be just now, and some of the factories are forced to work nights to fill orders. A more prosperous season they have never had, according to all reports.

Alsa Guthreaux, who was in jail in Toronto, for robbing the London and Paris jewelry store of \$1,500 worth of jewelry, and who was admitted to bail in \$2,500, has fled. He was at one time the civil sheriff of New Orleans.

An auctioneer, by birth a native of the Emerald Isle of course, caused to be printed on his hand bill at a recent auction sale of jewelry in this city, "Every article sold goes to the highest bidder unless some gentleman bids more."

I. M. and J. W. Miller, of the firm of Miller Bros., who have been abroad for some time, returned home August 20, greatly improved in health and prepared to enter upon the fall campaign with their accustomed enterprise and vigor.

Clasps of enamel and Rhine pebbles and sometimes of genuine jewels, are displayed in various parts of the costume, sometimes holding trimmings down on the skirt. Some of these, in the form of medallions, have a very old time look.

Among the newest trills in jewelry are the microscopic watches attached to the neck by a serpent coiling upon the skin, Grecian necklaces composed of five rows of variegated pearls with diamond clasps, and arrows, which are again worn in the coiffure and corsage.

It is a well known fact that Parisian jewelers keep nearly all their stock in their show windows, many of which are not only very extensive but elaborate in architectural design. In France, dealers are prohibited by law from exhibiting rolled plate or imitation goods in the same shop where genuine goods are exposed.

He was in a Maiden Lane jewelry store and she a beautiful blonde from Brooklyn—they were at Long Branch, walking by the seaside, when he sighed and she sighed; and she was by his side, and he by her side, and they were both beside themselves, beside being at the seaside, where she sighed and he sighed.

The "sad sea waves" at Coney Island and Long Branch were singing sweet lullabies in the ears of many western jobbers during last month. Some of our friends who went in bathing got rather more of the "nasty deep" than they contracted for, the bounding billows filling them full of salt water.

L. & A. Mathey, the well known importers, of this city, have received from H. L. Matile, the eminent Swiss watchmaker, a miniature cylinder watch movement, the dial of which is about the size of a gold dollar. This has been artistically set in a ring and surrounded with diamonds, the whole covering a surface as large as a nickel penny. It is an exquisite specimen of the watchmakers' skill, and makes a valuable and desirable finger ornament. The manufacture of such infinitesimal works is more a labor of love than profit.

American jewelry has been extensively copied in Florence and Genoa by some of the best known manufacturers. They depend largely upon American ideas for designs for sleeve buttons, pins, and bracelets, while Waltham watches are found in the show windows of many of the leading jewelry stores in Paris.

The bright electric lights that have been introduced in some of the jewelry houses are reported to make gold goods look pale and silvery, and to detract from the brilliancy of diamonds. The incandescent electric light, however, is said to be very pleasant and not to detract from the appearance of either gold goods or precious stones.

There never has been such an extensive display of novelties in the jewelry business as is to be seen this year. All manufacturers have excelled themselves in the production of goods embracing new designs and superior workmanship. The result is an exhibition of goods that does credit to the goldsmiths' art, and marks an era of decided progress.

Never before have so many diamonds and specimens of rich jewelry been displayed at the summer resorts as during the present season. Rich and rare jewelry is all the rage, and no lady is regarded as being in full dress without some diamonds in her costume. At Saratoga especially the display of diamonds in evening toilettes is something remarkable.

Accounts of the remarkable intelligence shown by the Belgian pigeons employed in smuggling jewelry, etc., in their recent flight from Portugal and Spain to their homes in Brussels and Pecq, have more than ordinary meaning when read with recollection of the inhuman "sport" that deprived of life 20,000 of their kind at Coney Island a month or more ago.

A house engaged in the watch trade at La Chaux-de-Fonds sent by post a case of watches worth £460 to a consignee in Bulgaria recently. They insured them against loss for £5,000, and bribed a Bulgarian postoffice clerk to steal them. Then they claimed the insurance. The fraud was discovered, and the shipper of the watches and the postoffice clerk were arrested.

One of our German exchanges credits Jurgans Bros., of Schramberg, Wurtemberg, with having received the second prize at the Melbourne World's Fair, for their exhibit of American watches. Probably our German contemporary has mistaken the character of the goods commented upon, or it is possible that Jurgans Bros. are really manufacturing imitation American watches?

Athens, nor Rome, nor Pompeii, at either of their most successful epochs, could begin to compare with the prosperity of New York at the present time. Turn down what street you will, evidence of prosperity will be seen on every side. Never before in the history of the world were so many new buildings in process of erection at the same time in any one city representing so many millions of dollars.

Many western jobbers have been in town recently, and judging from the orders they have placed, they anticipate a large trade this fall. It is a heavy strain on their physical forces to endure the ordeal of hand shaking, dining and winning, they have to go through from the time they reach the city till they leave. One would think that the jobber's lot was not a pleasant one, but they bear up under it manfully.

Messrs. Thos. Steele & Son, the well known jewelers of Hartford, once lost the mainsprings in eleven watches which were quietly hanging in position in their establishment during a thunder storm, thus making the disturbance of the elements rather an expensive luxury. It has been observed that more mainsprings break during the dog days, the sultry weather in August, than at any other season of the year.

The silver ware manufacturers are doing splendid work in the production of unique goods for the fall trade. In this respect they are nowise behind the manufacturing jewelers. Some of the novelties they are exhibiting are highly artistic in design, and of superior workmanship. Their range of novelties is constantly increasing, and they now make almost everything that is susceptible of being manufactured in this class of goods.

Two girls belonging to a church choir in a town in Ohio, got locked into the church the other night, while they were talking about fashions. They gave the alarm, when a man who runs a jewelry store near the church put a board up to the window and they slid down to the ground. The most singular thing was that after they had got safely to the ground they looked mad and went off without thanking the man, and they won't speak to the man when they meet him. He couldn't account for it until he went to take the board down, when he got slaves in his fingers, and scratched his thumb on a shingle nail that stuck up through the board. Some men are mighty careless. He says he don't care only for other hearts that ache.

Many southern buyers have been noted in Maiden Lane during the past few weeks. The amount of hand shaking they undergo would astonish a President elect, while the confidential whispering in their ears must remind them of a political caucus. After a siege of this kind, they are usually led captive to the Jewelers' Exchange in John street, where rest and refreshments generally restores them to strength, and the combat is again renewed.

Albert H. Potter, an American watchmaker, now located at Geneva, Switzerland, who has been honored by an election as an honorary member of the horological society of that city, is conceded to be one of the best workmen in Switzerland. Native manufacturers concede this, and attribute to his efforts much of the improvement that has been made in watchmaking in that city. As Americans, we naturally feel a pride in this voluntary recognition of American talent.

The first annual meeting of the Wisconsin Retail Jewelers' Association was held in the senate chamber at Madison, Wis., July 15. After the usual routine work the following officers were elected: President, J. Taylor Smith, Whitewater; First Vice President, L. D. Merrill, Sparta; Second Vice President, C. B. Tousley, Fort Atkinson; Secretary and Treasurer, W. H. Thorp, Beaver Dam; G. Kuenne, Fon du Lac; C. B. Morse, Evansville, and O. R. Ryan, Reedsburg, Executive Committee.

Mrs. George Ward Nichols, wife of the head of the College of Music, Cincinnati, whose pottery decorations have been attracting much attention, and whose work has found ready sale at Tiffany's, has just engaged a talented Japanese artist to come here and take charge of her Rockwood pottery. His name is Ichidzuka Kenzo. He was engaged for Mrs. Nichols by Minister Bingham. Specimens of his work in Satsuma, Kutamaiki, Owarrrie, and Imarie were exhibited in that city are very fine.

There are several pool rooms in Barclay street that are very enticing to young men, and clerks and salesmen in great numbers are in the habit of patronizing them. If employers would drop around these plague spots about noon when some big race is on the tapis, they would be able, no doubt, to account for the occasional shortness in their cash accounts. These gambling resorts have done more to corrupt the morals of the young men of the city than any other one thing, because of the facility they afford of betting small sums, with an indefinite prospect of winning large ones. An efficient police force would break them up.

A notorious thief, dressed as a countryman, entered the jewelry store of U. F. Wolf, No. 104 Greenwich street, and wanted to know the price of a watch that hung in the window. Mr. Wolf, not understanding which one he meant, was induced to go outside to identify it. He was detained in conversation by the countryman while a confederate inside sixed a number of watches and attempted to escape. Mr. Wolf caught him, when another confederate came up, claiming that he was a detective and had seen the whole performance. Mr. Wolf was induced to surrender his prisoner and the stolen watches to the alleged detective, who started towards the station with his prisoner. A few minutes later Mr. Wolf went to the station house to make complaint against the thief, when he learned that the countryman, the thief and the alleged detective were confederates and had got away with his watches. Subsequently Michael McMahon was arrested for the robbery and fully identified as the thief by Mr. Wolf, whose loss is about \$400. The detectives are confident of recovering the goods.

A recent decision in a suit for infringement of a design patent, will be of interest to our readers. The case was tried in the United States Circuit Court. The plaintiff, Chas. F. Wood, had invented and patented a design for jewelry settings, consisting essentially of a bird seated on a twig with an arrangement of leaves, etc., incrustated in stone with white and gold colors, also set with diamonds. The infringement was practically a copy of the work, with unimportant variations. Judge Wheeler says in his decision after pointing out some differences in the details of the two designs: "Altogether more is required than to observe and consider the artistic effect of each, to bring these differences to notice. Looked at as ornaments desirable for their beauty or appropriateness according to the taste of the wearer, these differences in the details become immaterial. The patent is for the appearance which the design will add to articles of jewelry, making them desirable according to its attractiveness to those who may observe and wear them, and that the defendants W. S. Dolbey and others have infringed the design and are liable for damages. It appears quite just that the plaintiff should be secured by his patent, as such designs involve considerable outlay and risk, and are essentially inventions, not mere arrangements for artistic effect." W. K. Hall appeared for plaintiff and Worth Osgood for defendants.

Pete V. Nasby, describing Petticoat Lane in one of his London letters to the Toledo Blade, says: Across the way is a beer shop. On the one side of the bar you find yourself in a low room just the size of the bar below, and a curious scene presents itself. These rooms, and there are scores of them in Petticoat Lane, contain on an average any number of millions of pounds that you choose to say. I could say that that there were a hundred millions of wealth in each one, and perhaps wouldn't be very much out of the way, but, as I desire to be accurate, I will not. If there is anything I detest, it is exaggeration. I shall hope to distinguish myself by being the first tourist who adhered strictly to the naked truth. These rooms are diamond marts. In them all the diamonds that deck out royalty and the wives of patent medicine men and other people who are not royal, are first handled. To these dingy rooms in the very heart of the worst quarter of the worst city in the world comes the diamond merchant, and here he meets the broker who deals with the manufacturer in the city. Here all the diamonds of London are first bought and sold.

A curious story is told of an exhibit in the show window of one of the leading jewelers of Vienna. The object of attraction is a brooch magnificently studded with gems, in the middle of the chasing of which is inclosed the most singular of centers—four common, old, bent, and corroded pins. This brooch is the property of the Countess Lavetskofy. The pins have a history, of course. Seven years ago Count Robert Lavetskofy, as the story runs, was arrested at Warsaw for an alleged insult to the Russian Government. The real author of the insult, which consisted of some careless words spoken at a social gathering, was his wife. He accepted the accusation, however, and was sent to prison. In one of the dungeons in which the Czar was said to be fond of confining his Polish subjects, the unfortunate martyr for his wife's loose tongue spent six years. He had only one amusement. After he had been searched and thrown into a cell, he found in his coat four pins. These he pulled out and threw upon the floor; then in the darkness he hunted for them. Having found them, perhaps after hours, and even days, he scattered them again. And so the game went on for six weary years. "But for them," he writes in his memoirs, "I should have gone mad. They provided me with a purpose. So long as I had them to search for, I had something to do. When the decree for my liberation as an exile was brought to me, the jailer found me on my knees hunting for one which had escaped me for two days. They saved my wife's husband from lunacy. My wife therefore could not desire a proper ornament."

The Providence Journal, which comes from the vicinity of immense cheap jewelry factories, has the following on "paste diamonds," which are simply glass of great purity: "When imitation diamonds were introduced, it was found that to cut glass precisely like a diamond did not produce the sparkle characteristic of the diamond; therefore to secure this the flat surface of the diamond was made pyramidal on the imitation, and, of course, ended in a point. By certain laws of light this pyramidal surmounting of the glass provided for the required distribution of ray surface to produce the diamond sparkle, or something akin to it. A real diamond is never cut with the pointed apex, and hence it was possible always to distinguish the real from the spurious. But after a time the buying public learned this little circumstance about the cutting process, and other means were resorted to. The glass was cut precisely like the diamond, and the sparkle was given to or provided for it by a coating of white foil applied to the under side of the glass. The setting of many diamonds is arranged in such a way that the buyer may see the under side of the gem. This was overcome by arranging the setting so as to prevent inspection of this kind, which could not be done unless the stone was dismounted, if we may use that term. With these facts known to the buyer of diamonds, he need not be deceived except in the latter case, where the setting hides the under surface, and if he has any doubt about that he can let it alone. But the object of imitation diamonds is not to deceive buyers; if it was they would not be offered for two dollars. No one, however deficient in diamond criticism, need be deceived in buying diamonds. No dealer of any repute ever attempts to sell imitation for real diamonds. No reputable man ever thought of it. His reputation and occupation would soon be gone. There are very few persons who do not test their wares at other than the buying place, particularly if the gem is a costly one, and it is certain that no one was ever presented with jewelry of reasonable worth, who did not set out at once to learn its purity and value, and very disappointing it has doubtless been in some cases that the gold or diamond was only brass or glass."

THE

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THE

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The Business Outlook.

THE FALL SEASON is now upon us, and the members of the jewelry trade having enjoyed their summer vacation, are once more in their accustomed places ready to receive their customers in their usual pleasant and agreeable manner. The summer was notable for the unusual number of buyers who put in an appearance during the latter part of July and August. They appear to have been attracted east by the extraordinary temptations of the many watering places in this vicinity, and being here, combined business with pleasure and laid in their goods for the fall trade. As a consequence more goods were disposed of in July and August than were ever known to be sold in those months in many years.

The indications for a good trade this fall and winter are excellent, notwithstanding the croakings of a few who persist in predicting dull times and a hard season. It is possible, of course, that another period of business depression may be impending, but if so, it has not cast its shadow before, for everything at present promises continued prosperity. There is no scarcity of money; on the contrary, there is a plethora in the market seeking investment at a low rate of interest. Credits are held well in hand, and collections have been good. When the crops begin to move business promises to be unusually lively. In some sections of the country there has been a prolonged drouth, and there are predictions of a shortage in the production of corn, wheat, oats, etc., but these croakings are heard every year, and it is better to estimate the crops after they are harvested than before.

Competition in the jewelry trade promises to be unusually active. Manufacturers have shown great activity in preparing for the anticipated demand, and in bringing out new styles and designs to tempt buyers. Never before has the trade presented so attractive an

appearance as at the present time, and he must be a hard customer to please who cannot be satisfied with the beautiful and artistic examples of the goldsmith's art to be found in the stores of manufacturers and jobbers. In high class diamond work the greatest amount of ingenuity has been displayed, a high order of artistic excellence having been invoked both by the designers and the workmen. Not only do our leading houses present precious stones in attractive forms, but many examples show a higher degree of art and of skilled workmanship than has ever before characterized this class of goods, and the examples are not only a credit to the goldsmith's art but to the country that produced them. Bracelets, pins, necklaces and other articles of personal adornment, in diamond work, are shown in almost endless variety, and are as beautiful as they are varied. The same exquisite taste and skill are displayed and similar effects produced in high-class gold goods, and illustrations of art and skill in Roman, Etruscan and bright work abound on every hand. There being a wide range for fancy in goods of this class, the designs are naturally more varied, full scope being given to the genius of our designers and to the skill of our workmen. This range embraces examples of all kinds of jewelry known, from the severely classic and antique to the most elaborate conceptions of modern times. It is gratifying to us to note the wonderful improvements that have been made of late years in the better grades of goods, and also the increasing inquiry for them. A liberal demand for excellence invariably gives birth to the ability to produce it. Whether the artistic excellence of the designs has inspired our workmen, or whether they are developing talents that have long lain dormant, we cannot say, but we can testify that in their productions for the season of 1881-2 they have fairly surpassed all previous efforts. It is to be hoped these goods will be fully appreciated by the trade, and our workmen thus encouraged to further improvement, as our dependence is upon them to sustain the honor of the goldsmith's art in this country. Medium class goods are characterized by similar excellence and novelty of design and superior workmanship, while the variety of styles is almost endless. During the last few years a marked improvement has been made in the quality of goods for gentlemen's wear, while the opportunities for variety are increasing each year. In scarf pins and rings the fancy of the designers run riot, and while the plain diamond, pearl or ruby adorns the scarf of the severely elegant gentleman, the fancy of every one can be suited either in emblematic goods, sporting pins or jeweled illustrations of natural history. While a large portion of this trade in gentlemen's goods has fallen into the hands of outsiders, and is supplied with "cheap and nasty" material, there is still a liberal demand for goods excellent in style and of intrinsic value which will always be supplied through the regular dealers.

With all the varied attractions offered by the manufacturers this season, each of whom seems to have been determined to outdo his neighbors in novelties, the prospect is that competition will be unusually active. Sagacious merchants, however, will not push trade beyond what it should be legitimately. Nothing is so injurious to the trade as an overstocked market. Many a dealer has been bankrupted in his efforts to carry a stock of old goods that had been crowded upon him by jobbers anxious to unload their superfluous

stocks. The successful dealer is one who studies his market carefully, who carries a stock equal to its demands, but who refuses to be overloaded by manufacturers anxious to get his name upon their books. Our advice to retailers is to supply yourselves with new and attractive goods sufficient to brighten up your old stock, keeping your lines full, introducing the latest styles to catch the attention of your public, but not to overload. If there is a surplus of goods manufactured let the makers of it carry it in preference to loading your shelves with more than there is a market for. Buy carefully, sell cautiously, pay promptly, read *THE CIRCULAR* regularly, and success is sure to attend your efforts.

Unsettled State of the Diamond Market.

MUCH consternation has prevailed in Maiden Lane and vicinity of late owing to the unsettled condition of the diamond market, which was due to an advance in prices in the European markets. Advances received here are to the effect that diamonds in London have advanced from 30 to 50 per cent., and that even at the advanced rates they are remarkably difficult to obtain. The reason given for this is the temporary failure of the product of the African mines. It is well known in the trade that a large portion of the diamonds of commerce were taken from the Kimberly mines. This was a tract of land owned by different claimants, the claims being contiguous to each other, covering but a comparatively small tract. The miners had honeycombed the soil in their search for gems to a considerable depth, and without properly supporting the overlying earth. As a consequence the mine recently caved in, filling the pits in which the miners were at work, and virtually closing the mines. A company of English capitalists has now bought the mines and will reopen them eventually and work them scientifically. Meantime, however, the supply of diamonds has nearly given out, but few reaching the market from other sources. These same English capitalists have also formed a syndicate and have obtained control of nearly all the diamonds for sale in Europe, and are holding them for a further rise. Our importers say they experienced greater difficulty in buying diamonds abroad, even before the recent advance in price, than they have in selling them in this country. Foreign dealers apparently had an inkling of what was coming and refused to show their parcels except to well known buyers whom they felt bound to accommodate, and then preferred not to sell. At present very few really fine stones are to be had abroad at any price, and the syndicate says none are being found in the mines. As a consequence of all this diamonds are actually selling in New York for less than they are in the markets of Europe. Importers must supply their customers, and are doing so at an advance of about 20 per cent. But they had rather not sell, for they cannot replenish their stocks for the price they would get for them. It is reported that one firm which bought largely in Europe before the price was advanced, recently sold their purchases to Amsterdam merchants by cable, realizing a profit of about 20 per cent on the transaction. This condition of things has had a disastrous effect upon the cutters and polishers. Rough goods that could be bought a year ago for £6 or £8 per karat, cannot now be had for less than for £10 to £15. Merchants say they cannot sell them for the difference, so they seek to cut down the price of cutting. In fact the whole trade in diamonds is unsettled, with little prospect of an immediate improvement. Some buyers visiting New York have intimated that this hue and cry was gotten up by the importers for the sake of putting up prices. We assure our readers that this is not so, for the importers are quite as demoralized as the buyers. If they were to sell all the goods they have at an advance of 20 per cent, they would lose money, for they would have to pay a greater advance to obtain the new stock they would be compelled to buy. They would rather keep what they now have till the market gets settled abroad than to take the chances of not getting any more goods when they want them. For the past few weeks the dealers in

diamonds have been in a quandary; buyers were here ready to take the goods, but neither buyers nor sellers dared to fix a price on them. While it is believed that the present scarcity will continue for some time, it is thought that the syndicate will fix prices definitely before long, so that the trade will not be so unsettled. Meantime the fact stares us in the face that diamonds are extremely scarce, that they have advanced in price, and it is uncertain when the price will have reached the maximum. At the same time the demand is more active than ever before; there are more worn than formerly, and there are not enough fine stones to supply the demand for them. Retail dealers who have the good fortune to carry a stock of diamonds should take advantage of the unsettled condition of things and sell only at a good profit, for they certainly will be unable to replace them without paying considerably more than they did for those they have. If some one would discover a good diamond mine about this time it would be a good find.

Incompetent Workmen.

THERE is probably no trade that suffers so much from incompetent workmen as that of watchmaking. In almost every other calling the botch work done by incompetent workmen can be corrected or covered up, but in watchmaking the case is entirely different. Five minutes tinkering over a fine watch by a botch workman is liable to ruin it past redemption, or to so impair its usefulness as to necessitate extensive repairs by a competent hand. The country is full of these botch workmen, and, outside of the large cities, an expert journeyman watchmaker is the exception rather than the rule. There are several reasons for this, the chief of which is the lack of a thorough system of apprenticeship in this country, and another lies in the fact that when a workman has really become an expert at the business he is ambitious to set up for himself. The credit system that predominates enables him to do this readily, so that a good workman, even though he has no capital, finds little difficulty in obtaining a stock of goods and setting up in some interior place as a jeweler and watchmaker. While, therefore, there are plenty of good watch repairers in the country, there is a great scarcity of expert journeymen. As there is a great demand for these half-fledged workmen and green apprentices who set up as journeymen, occupying seats at the bench that should be filled by competent workmen, and botching work that should be done with care and skill.

The absence of an apprenticeship system is working great injury to the trade, and spoiling many young men who, under proper instruction, would become good workmen, but who instead forsake their teachers to become botch journeymen, tempted by the offers of more pay. They have a smattering of the technicalities of the trade, and may be competent to take a watch to pieces and put it together again, but are totally ignorant of the science of horology and the scientific mechanism of a watch. In the years gone by, boys used to serve an apprenticeship of seven years before they were deemed competent to serve as journeymen. During the last year of their apprenticeship they were permitted to make entire some article as a specimen of their workmanship, which they could subsequently exhibit as a sample of their work as a recommendation for employment. Now a lad goes into a shop as an office-boy, runs errands for a few months, sweeps the shop, is permitted to do a little filing, picks up a little knowledge of the lathe, and by the end of the year considers himself as good a workman as any in the shop. He becomes too valuable, in his own estimation, to remain longer as the shop boy or to be considered under instructions, so he migrates to some other locality where he can at least get good wages if he cannot do good work. The scarcity of well trained competent workmen forces employers to give these fledglings bench room and to put up with their shortcomings. American boys have a natural faculty for mechanics, but they lack the necessary application to fit themselves for expert workmen. Their knowledge is superficial

rather than thorough. They would rather invent a labor-saving machine than do the hand work the machine is calculated to supersede. So it happens that while American watchmakers have the most complete machinery in the world, foreign watchmakers excel them in hand work. Our boys are altogether too ambitious for their own good; they are not anxious to be thorough, but are content with superficiality. In the old country fathers teach their sons their trade and take special pains to make them proficient in every branch, so that the son succeeds the father in business, teaches his sons the trade, and so generations of skilled workmen have their origin in a single family, doing business for generations in the same place and priding themselves on the antiquity of the house. Here the boy is so ambitious to become a man that he scorns an apprenticeship and is past teaching before he is out of his teens. As an illustration of the satisfaction with which some parents regard this superficiality on the part of their sons, a good story is told by an old watchmaker, whose indignation boiled over as he related it. He was the proprietor of a store in a flourishing country place, where he was making a living by hard work at the bench, having served an honorable apprenticeship to the trade. A neighbor came to him one day with his son, a lad about sixteen years old. The father asked the watchmaker what he would charge to let the boy come into his shop for three months to learn the trade. He said the boy had already taken a clock to pieces and put it together again so it would almost run, and he thought with three months' training this precocious genius would make an expert watchmaker. There are any quantity of doting parents who cherish similar fond fancies regarding their hopeful offspring, and are content that they shall eat of the bark of the tree of knowledge without seeking to enjoy its fruit.

It may be urged that employers are to blame for encouraging this class of half-fledged workmen by giving them employment. The fact is that the demand for workmen exceeds the supply, and employers are forced to put up with what they can get, trusting to luck to bring them out all right. If employers could come to an understanding among themselves and combine to secure the result, they might compel young men to learn their trade thoroughly. They might, for instance, demand from every applicant for work a certificate from some former employer that he had served a certain number of years at the business and was a competent workman. If they refused to employ any applicant who could not produce such a certificate, a long step would be made toward securing good workmen. But employers are somewhat to blame for their treatment of apprentices, or the boys who serve them, in not taking pains to see that they are thoroughly instructed. A contract of apprenticeship or an engagement with a boy, has two sides to it; and if the boy is bound to give faithful service, the employer is equally bound to teach him the trade. Neglecting to do this the employer inflicts an injury, not only upon the boy, but upon the trade generally, by sending out an incompetent workman. An amusing case was recently tried in this city where a boy recovered a verdict against his employer. The boy was apprenticed to learn the watchmaking trade, but showed an aptitude for repairing clocks, preferring such work to any other. At the end of two years the father complained that his son had only learned one branch of the business, and received no instruction in any other. He brought suit against the employer, and succeeded in getting judgment for \$600. This so disgusted the gentleman, who was an Englishman, that he sold out his business, and returned home, refusing to live any longer in this "blasted country" where the apprentices were the bosses. While the boy's choice of work gave his employer an opportunity to keep him engaged at one kind of work, he nevertheless had a duty to perform and should have taught him every branch of the business.

At the recent meeting of the Wisconsin Retail Jewelers' Association, a resolution was adopted looking to the establishment of a sort of horological school in connection with the Association, and it was agreed that at future meetings each member should bring with him

some specimen of his workmanship in watch work, jewelry, tools or new inventions. This is a capital idea, and may be followed to advantage by other associations. A still better plan, however, would be for the National Guild to establish a school of horology, where workmen and apprentices could be instructed in the science as well as the mechanics of watchmaking. It need not be a costly establishment at the outset, for, once established, it would grow rapidly and soon become self-sustaining, as any number of young men would come forward and cheerfully pay for their instruction. All that would be necessary as a beginning would be a room, a lathe, the necessary tools, and a thoroughly scientific and practical demonstrator. Such a movement inaugurated by the Guild would, beyond question, be supported by several State Associations, and encouraged by the trade in general. There are several schools of horology in Europe that have had a most beneficial influence upon the trade, a fact that is conceded by all foreign manufacturers. The trade in this country is far behind in this respect, having neither a horological school nor an apprenticeship system that compels boys to master their trade before setting up in business as proficient journeymen. We commend this suggestion to the National Guild. A school of horology is one of the necessities of the present condition of the trade to secure a better class of workmen and to weed out the bitches.

Scenes in Maiden Lane.

MAIDEN LANE at all seasons presents an appearance of life and activity, and when buyers are plentiful in town it becomes one of the most pushing and enterprising localities in the city. Occasionally some amusing scenes are presented which are laughed over and highly enjoyed by the trade, even though some unfortunate member of it may be the victim. We have frequently alluded to the "tricks and the manners" of the curbstone brigade of drummers, who lay in wait on the street corners for country buyers, and to whose impudence and cheek there is no limit. Recently Mr. Bingham, of Indianapolis, was in the Wilcox Silver Plate Company's office buying goods. A horde of curbstone drummers swarmed about the door waiting for an opportunity to lay siege to him, and praying (metaphorically) for him to set foot upon the sidewalk in front of the place they dare not invade. Wholly unconscious of the designs they had upon him, and not being familiar with their wily ways, Mr. Bingham went on selecting goods until something in the show window caught his eye, and he stepped outside to get a better view of it. Instantly he was seized upon by about a dozen of the curbstone brigade, each shoving his card under his nose and insisting upon the privilege of exhibiting his samples to him. In their efforts to force their cards upon Mr. Bingham he was pulled and hauled about in no very gentle manner, and to the imminent peril of his hat, coat and other garments. They went for him like so many insane hackmen at a railroad station, bellowing in his ears the names of the firms they represented and their own names alternately. He was finally rescued by the gentleman who was serving him in the Wilcox establishment, taken inside and resuscitated after vigorous efforts. Mr. Bingham thinks he had a narrow escape for his life, and the next time he visits the Lane proposes to wear armor loaded with dynamite for the express benefit of these drummers.

Mr. Shaw, of Galveston, is a personal friend of Mr. Steele, of the firm of Brainard & Steele. Mr. Steele is an old traveler in the South, and has made many warm friends in that locality, all of whom visit him when they come to New York. Mr. Shaw made his headquarters with Brainard & Steele, intending to buy some goods in the city, but mainly to have a nice quiet time with his old friend. His presence in town soon became known to the curbstone brigade, and they commenced their customary annoyances. Every possible device was adopted by them to smuggle their cards in to him, and they kept interrupting him so that he could scarcely find time to write his letters. In an inadvertent moment he attempted to go into

the street, when he walked directly into the trap prepared for him. Eight or ten stalwart drummers held possession of the stairs, and his appearance was the signal for a demonstration he had not anticipated. Cards were shoved into his face, he was shouted at till rendered nearly deaf, he was pulled about, jostled and hustled, and one or two of the assaulting party incontinently began exhibiting their samples then and there on the stairway. Mr. Steele finally heard the disturbance and raised the siege. Mr. Shaw says that if he had not been delivered from the gang as he was, he would have bought all the goods they had as a means of self-protection. During those fearful moments, unprotected on the stairway and defenceless, he thought of his family, and defiantly resolved to order everything offered rather than yield his young and priceless life without an effort to save it.

A dozen or more of these drummers were themselves the victims of a practical joke a few days since. Some wag gave out that Mr. Norton, of N. Matson & Co. of Chicago, was in the city prepared to buy liberally. They were informed that Mr. Norton was then closeted in the office of Enos Richardson & Co. The valiant brigade, each with sample box in hand, took position on the stairs leading to Mr. Richardson's office, determined to interview Mr. Norton or die on that particular spot, regardless of the health laws. They overflowed from the stairway to the sidewalk, blockading the passage, spitting freely to the right and to the left, leering at passing ladies, telling obscene stories, and loading the air with inane profanity. Time passed, but Mr. Norton did not appear; still these warriors held the approaches to the citadel. Noon came, but the brigade was true to its colors; one o'clock arrived, and the free lunches remained unworked by the courageous besiegers; at two o'clock there was some wavering, and a council of war was held. The most courageous of the lot was selected to invade the office of Richardson & Co. and reconnoitre. He mounted the stairs tremblingly, opened the door cautiously, and with a voice trembling with suppressed anxiety, inquired for Mr. Norton. He was not there; had not been there; was not in the city, and wasn't even expected. The feelings of the brigade can be better imagined than described. With a farewell squirt of tobacco juice on the stairs they departed, "more in sorrow than in anger," feeling that the holiest sentiment of their natures had been trifled with, and nothing could recompense them for the free lunches they had lost.

One day recently a well dressed, gentlemanly-appearing young fellow entered the store of Hartley & Graham and leisurely sauntered about, looking at the many curious and beautiful goods there on exhibition. As he merely expressed a desire to look about, little attention was paid to him until he was observed to put his hand in the pocket of a vest that one of the clerks had laid off and then more attention was paid to him than he really desired. In fact, all eyes were upon him; also, several hands; the small change he had abstracted from the vest was found in his possession, and this elegant young gentleman, who was cultivating an aesthetic taste by studying the beautiful, was incontinently turned over to a policeman and locked up in the Tombs, where he now languishes to meditate upon the evanescence of human happiness.

On another occasion, a young man, evidently a companion of the one above mentioned, entered the store of Albert Berger & Co. and, in a fit of abstraction, secreted three parcels of watch glasses under his coat, and was gently piqueur toward the door. The eagle eye of Mr. Ducommun, however, had noted the little indiscretion of the young gentleman, and he gave the alarm. Thereupon Mr. G. Walter, who was in the rear of the store, gave a bound and was after the retreating individual like a shot. An exciting chase ensued; the impetuous Mr. Walter, in his eagerness to catch the thief, ran against and upset a heavy truck loaded with flour, caromed on an apple woman, upsetting her basket, ran over a dog, embraced a nurse with a baby in her arms, projected his head into the stomach of a corpulent butcher, extorted maledictions from numerous persons with whom he came in contact, but never lost sight of

the dodging thief. At last he came up with and seized him, when a tussel ensued, and both fell through a show-case on the sidewalk, bereaving it of every symptom of glass. During this lively chase not a policeman was visible; but Mr. Walter held on to his prisoner and marched him back to the store in triumph, when the stolen glasses were found on his person. They were worth about \$2.50, but the thief could not have realized more than fifty cents on them, and for this paltry sum he had challenged Mr. Walter to a foot race and been beaten. When the excitement had subsided a policeman appeared to find out the trouble, and energetically marched the prisoner to the station house.

There is a great deal of life in Maiden Lane, and those who spend their time there see many phases of it. It is not all buying and selling of precious stones and rich and rare jewelry, but human nature takes on as many forms there as elsewhere. But the greatest nuisance in the street, the greatest drawback to business, and the most obnoxious persons to be met there can all be found in the carbstone brigade of drummers.

WE again urge the trade in general to be prompt in purchasing their goods for the holiday trade. Last year, many dealers were disappointed when they came to New York, to find the stocks had been culled down and the choice goods secured by the early buyers. This year buyers have been more numerous even than last year, and those who put off making their purchases till the last moment will find the new styles and choicest goods all gone. The indications point to an unusually good holiday trade, and dealers should make haste to supply themselves. At present the market presents a greater variety of choice goods than have ever before been manufactured, but these will last but a short time, as manufacturers are reluctant to pile up goods in excess of orders. Now is the time to buy if one desires the full advantage of the market, as no manufacturer will undertake to deliver holiday goods in time if they are ordered at the end of the season. To get them early and be sure of them, orders should be filled now.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the exclusive official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. We therefore devote this column to the interests of the League and its membership. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box 4001, P. O., New York*, or the office of THE CIRCULAR.

The wisdom of taking as prompt action as was taken, eventuating in the enactment of the law for the protection of charitable, benevolent and beneficiary associations, societies and corporations, assembly bill No. 709, passed at the last session of the New York Legislature, is shown now by the fact that the apprehensions of the officers of such societies, that sooner or later they would be by decision of the Attorney General, classed as insurance companies, and consequently compelled to comply with the same requirements as the insurance companies, were well founded. The Attorney General of Illinois, James McCartney, has given opinion to the effect that notwithstanding the peculiar distinctions to be made between the benevolent and beneficiary societies and the insurance companies, these societies are insurance companies, and are liable to all the provisions of law governing insurance companies in that state. This decision is in accord with that of the state of Missouri and of the law recently passed in Ohio. These states, instead of having one set of laws to control the insurance interests and another set to govern the benevolent societies, are making effort to govern both with one series of laws. It makes as consistent a showing as a hen hatching out and raising a setting of duck eggs.

At the last meeting of the Executive Committee on September 2, eight applications were tabled for further consideration and one was

rejected. The following named gentlemen were accepted as members: Julius Bieber, Chicago, H. Falch, Leopold Newhouse, and Edward E. Newton of Chicago; Wm. H. Bovard, Lewis Breiflinger and Frank Emy, of Philadelphia; Freeman A. Durgin, John Greaves and Louis Storch, of St. Louis, Mo.; Uri Clark, Ithaca, N. Y.; S. D. English, Hazelton, Pa.; T. J. English, Newark, N. J.; Calvin Hornaday, Keokuk, Iowa; G. H. Hulbert, Middletown, Conn.; Max Lehrfeld, North Attleboro, Mass.; H. L. Lemkuhl, Baltimore, Md.; Oliver Mason, Jacksonville, Ill.; Julius Meyer, Boston, Mass.; C. M. Morrison, Detroit, Mich.; M. C. Motch, Covington, Ky.; Thos. Kohner, Clarksville, Tenn.; Geo. W. Spier, Washington, D. C.; B. W. Warner, Kansas City, Mo.; Minor B. Webster, South Lyon, Mich., and Chas. H. McDonald, Andrew P. McGovern, W. W. Moore, Samuel C. Scott, Theodore C. Steinhaus, Henry Theis, Thomas W. Winter, of New York City, a total of 33 members added to the roll.

On Sunday, September 11th, the League met with another loss in the death from consumption of George D. Stevens, one of the early members. Exposure at the fair of the 7th Regiment, N. G. S. N. Y., resulted in a heavy cold which, settling on his lungs, was further aggravated by business reverses, which undoubtedly hastened his death. His beneficiary will, when the proofs are properly presented, be paid \$2,684.70.

In 1871, after the great fire in Chicago, a sum of money, (part of a large amount raised by the jewelry trade in the east), which was collected too late to be of service to the actual sufferers by the fire, was by a vote at a meeting of most of the original subscribers held at the Astor House in this city, placed in the keeping of Enos Richardson, Henry Randel and William Ruhl; the latter gentleman since deceased. The fund has been in the custody of Mr. Richardson, and through his prudent investment it has been augmented to several thousand dollars. Both of the surviving trustees are willing and even desirous that this fund should be transferred to the permanent fund of the Jewelers' League, in case there are no legal obstacles to such a disposition of it, as therein the income from it will surely be utilized in a direction as near as is possible, parallel with the direction sought to be given to the principal by the donors. The President of the League has been in consultation with the trustees, and when a proper course of procedure has been developed by the Counsel of the League, the co-operation of every member may be required, and in such a matter, as in all others heretofore, we have no doubt it will be cheerfully given.

We are pleased to acknowledge the receipt of a check for _____ dollars from _____ of _____ being the third donation toward the permanent fund of the League.*

*NOTE—Our smart compositor was so sure of a donation that he set this paragraph up in blank, but had no use for it this month. We discovered it too late to take it out of the form.—EDITOR.

Views of Correspondents.

This department of THE JEWELERS' CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

SELLING TO OUTSIDERS.

To the Editor Jewelers' Circular:

I have been a constant reader of THE JEWELERS' CIRCULAR for many years, and have always admired its straightforward and honorable treatment of all questions affecting the best interests of the trade. It is due to the efforts of the contributors, that the catalogue nuisance is checked, and other pernicious systems remedied. The retail trade owes it an everlasting debt of gratitude for its vigorous championship in their behalf. Now that the catalogue nuisance has ceased to be a horrible nightmare in the minds of the retailers, and that the various trade societies have now nothing more to complain of, won't you give a little space to record the trials and tribulations of that much abused western jobber, whose business life is represented by the members of the trade societies to be "a perpetual round of pleasure?"

I would call your attention to the manner in which certain small manufacturers from Providence and Attleboro are selling goods to those outside the jewelry trade. After having sold the jobber all the goods he required these travelers will hang about the doorways, lying in wait for the jobber's customers. Now, the jobber depends upon his retail trade for the business with which to meet his liabilities, just as much as the retailer depends upon his customers to meet his payments, yet these representatives of the manu-

facturers step in and rob us of the very cream of our trade. Moreover, after stocking the jobber up with all the goods he will take, these manufacturers visit every gem furnishing goods, dry goods, and other stores, and sell them in many cases at less than he will sell the jobber. So it goes; the jobber cuts under the retailer, and the manufacturer cuts under the jobber. There seems to be no remedy for this but in combinations of one class against another, the retailers refusing to buy of jobbers who sell at retail and to outsiders, and the jobbers refusing to patronize those manufacturers who seek the retail trade.

The manufacturers depend upon the jobbers to dispose of their products; they sell to them on credit, and expect them to pay their bills promptly. It is singular that they do not realize the fact that when they steal away the custom of the jobber, they are depriving him of the means of paying his honest debts. The same rule holds as to the relation that exist between jobbers and retailers; when jobbers sell goods to outsiders at the same prices they do to retailers, they ought not to be surprised when the retailer falls to pay his indebtedness. When one class is thus undermining another and itself as well—there should be little astonishment if measures are made, if failures in the trade, or that so many offers to compromise are made, if the manufacturers gave their hearty support to the jobbers, and the jobbers to the retailers, each confining himself to his legitimate sphere, and not seeking to steal away the custom of his own customers, there would be a far better feeling in the trade and fewer failures. Such abuses are deserving of the severest censure from all who have the best interests of the trade at heart, and I sincerely hope they will receive it at the hands of THE JEWELERS' CIRCULAR.

There are three distinct branches of the jewelry business, the manufacturing, the jobbing, and the retailing. The line of demarcation between them is so distinct that no one can overstep it without being justly reprehended. There is room for each to operate in its own particular sphere, and there should be no "slopping over." Especially should all branches of the trade discourage the selling of goods to outsiders at less than retail prices, thus sparing the jobber and the retailer the necessity of running amuck with the stationer, the barber, and the tailor, to secure the trade that legitimately belongs to them.

A WESTERN JOBBER.

ABOUT JEWELERS' "PERQUISITES."

To the Editor of the Jewelers' Circular:

I am just in receipt of THE JEWELERS' CIRCULAR for September, in which I see on page 202 some horrible remarks by "H. J. P." He blames you for upholding morality in the trade; I say hold fast to good work, which will come out all right in the end. Draw the screws down still tighter; by so doing it will make some of those dishonest characters squeal. I say, give it to them! We have in the trade too many such dishonest characters; they are a hindrance to honest transactions and honest principle. I tell you if this man should withdraw his patronage as a subscriber, there will not be much lost; I say, stick to honesty every time! He says he must make a living; I say so too; but there are two ways to do this. The one is the straightforward, conscientious, honest way, and there is a devilish, deceitful, dishonest way, "H. J. P." seems to prefer the latter, and to believe that cheating his customers in the quality of the goods he sells them is legitimate. He may call these things "perquisites," but the good old name for them is stealing. I admire THE JEWELERS' CIRCULAR for the bold and persistent manner in which it fights the abuses in our trade, and I wish you long life and prosperity. S. N.

WILLING TO PAY FOR HONEST GOODS.

To the Editor of the Jewelers' Circular:

I have just read an article in THE JEWELERS' CIRCULAR signed "H. J. P." Never did I think there was a scoundrel in the honest trade of jewelers. A dealer who openly says he will sell 10-k. gold for 18-k., ought to be tarred and feathered, and carried through Maiden Lane on a rail; and if he is a manufacturer, I would like to know his name, and the names of all his friends who would discontinue THE JEWELERS' CIRCULAR, because it has denounced the honest goods in the market. When I bought 18-k. plain rings I want them 18-k. Have just received an invoice stamped (W. S., 18-k.). I pay a little more per doz. than most dealers, but they are warranted 18-k., and not 14-k., or 16-k. I have plain band rings stamped 14-k., but my jobber says they are only 10-k., and so I sell them as such. The first order I got was to go back on my hands for want of quality. At present the disgrace to our country, after the President's assassination, is cheap rolled-plate jewelry. A few years ago I could sell a good rolled-plate vest chain for \$6; to-day I sell the same for \$4.50 to \$5. The former will wear about ten years; but most of those made now will wear six to twelve months. For one, I wish there was nothing between a fine gilt and first-class rolled-plate chain; and to think one in the trade will openly acknowledge the fraud is too much. I wish the trade would unite and transport all such men, and give H. J. P.'s boy's finger nails a good cleaning, and send him along with his father.

Give it to them, Brother Hopkinson, and I for one, will back you to the last. Let us have good honest dealers so that we can depend on just what they say, the trade will pay them their price every time. I am going to tell my jobber again that first-class goods I will have, and am willing to pay extra for them, and if he cannot get them I will look elsewhere. Hoping there will be something done to exterminate these robbers, I remain,

Yours most respectfully,

WANTS HIS "PERQUISITES."

To the Editor of the Jewelers' Circular:

I read what "H. J. P." said in the last number of THE JEWELERS' CIRCULAR, and I agree with him. I have been in the jewelry business over twenty years, and I don't see any profit the way things are going. Prices have been cut down so that retail dealers can't make a living on genuine goods, and we must so that retailers can't make a living on cheap goods, and we must so that a man finds a chain that suits him, what difference does it make to him

whether it is twelve or fourteen karats fine? He wouldn't know the difference. It is like well and ill, and I am satisfied. If you showed it to him, and as long as he is well and ill, I couldn't do so if the goods were 14 karats fine, but I can when they are made of 10-karat gold. It is just so with watch cases; we couldn't make any profit at all on cases. It was not for the spring and stem-filing that adds to the weight. I tell a man that a case weighs so many pennyweights, and show him the maker's stamp as to the quality of the gold. There is no necessity for my telling him about the weight of the spring, and I don't do it. I didn't put it there and am not responsible for it, but I get just as much for the case as though the weight was all made up of gold. I find fault with is that the jobbers and manufacturers are willing to share with retailers the profits they make by debasing their goods, as liberally as they ought to, and a dealer has got to have his eyes open to know just where all the advantages of trade lie. I have been through bankruptcy once and compromised with my creditors once, and I have had a great deal to say about it. I have got a snug business, and a little something put away for a rainy day, but I never made a dollar till I had paid for my experience. It is no use trying to sell goods in our business for their actual value, for the profit has all been cut out of them. I agree with you that we are entitled to the perquisites that result from reducing the quality of the goods, but I think they should be divided more evenly between the manufacturers, jobbers, and retailers. You may think it a religious duty to preach morality to the trade, but I tell you the jewelry trade has mighty little to do with religion and morality. I follow the business to make money, and I propose to make it. I do business within the law, and no one has got a hold on me yet, and as long as I steer clear of the law I think I am just as good as most of my neighbors, particularly those who talk so much about the morals of the business. I am glad "H. J. P." brought this question up, for I am disgusted with a good many of the editors of THE JEWELERS' CIRCULAR. You are making a paper for the trade, and expect the trade to support you; consequently you have no business to keep exposing the ways in which the trade makes its profit. These ought to be trade secrets. It cost me a pile of money to learn them, and now that I know them I propose to make the best use I can of them. I hope in future you will use the columns of your paper for printing the news that is useful to us, and leave the trade to take care of its own morals. L. N. D.

[It is useless to argue with a man who openly declares that he has no conscience, and proposes to make money by swindling his neighbors. We can only repeat what we have said before, that the man who sells bogus goods for genuine, or misrepresents the quality of them, is no better than the man who picks your pocket. When 10-karat goods are sold for 15-karat, or a watch case, spring and all, sold for all gold, the purchaser is robbed just as effectively as though his money had been filched from his pocket. "L. N. D." and "H. J. P." may attempt to gloss over the offense, and call the plunder "perquisites," but the offense is not the less a robbery for all that, and is one the law will take cognizance of. Recently a man was arrested in this city and held to bail for trial for precisely this offense—selling 10-karat goods for 15-karat. The examining magistrate recognized the offense, and made the fellow give bail for trial. We wish more of these dealers in "skin" goods could be brought to justice. A few arrests for this offense would soon purify the trade, and give honest men a chance to do an honest business. As to THE JEWELERS' CIRCULAR preaching morality, it will be found the champion of legitimate trade, of honorable dealing, and of progress in the goldsmith's art, so long, at least, as the present proprietor controls it, which will probably be for the remainder of his life. Nor does he seek or desire the patronage of such men as "H. J. P." and "L. N. D." and if they will send us their correct names we will at once strike them from our books and remit them the amount of their unexpired subscription. "L. N. D." is the kind of a man we should suspect of having a competence, as he intimates he has, after having twice defrauded his creditors of their due. Probably when he gets tired of robbing the public with "skin" goods, he will turn his attention to compromising with his creditors again. Between the two methods of plundering he ought to get rich speedily, and we are surprised that a person of his genius and lack of conscience should have found it necessary to remain twenty years in business. He should either have acquired a sufficient fortune or reached State Prison long before this.—Editor.]

THE JOBBERS' BLACK LISTS.

To the Editor of the Jewelers' Circular:

I am a member of the Chicago Retail Jewelers' Association, and I do not like your article in the September number of THE JEWELERS' CIRCULAR relative to the black list. I admit there is no law to prevent jobbers selling to merchants or druggists; at the same time there is no law to prevent retailers from refusing to buy of such jobbers, or making their reasons public. I defy you or anyone else to show me any such law. You say if a jobber refuses credit, a dealer has it in his power to put his name on the black list. You are very much mistaken; such a thing could not possibly be done, for no jobber is placed on the black list unless the committee finds him guilty. No individual word is taken. You also say jobbers can't sue a dealer who buys from them, and also that a dealer who has had the trade of both the jobbers and the jewellers here if he hadn't done so. I did not join the Association for any per-

sonal benefit, for if anyone wants the best goods in my town they are willing to pay the least price for it, and will come to me every time, and the cheap trash I would rather someone else would sell, and that is just what they do. The last part of the article I do like. I think jobbers ought to be punished for sending price lists and goods outside the trade, and if they do intend to test the right of retail jewelers to the black list, let them make the maker's name a member. There is nothing that is hurting the trade so much as selling poor goods for good goods. I have not been troubled about getting poor goods, but the most of my goods I buy of houses outside the trade, and I have not been troubled about the road. I have never bought a bill of goods of an agent yet, or of houses that employ them, and I nearly always get just such goods as I order. If a jeweler orders poor goods and gets them, and loses his customers' confidence in selling them, he ought not to blame the jobber. I find there are but very few jobbers outside of Chicago, who do not put bill orders just as they are ordered, and I think they are the very ones we have on our black list. Or in other words, the jobbers who send lists out broadcast are the same that sell imitation goods. If you were a jeweler instead of an editor, you would know what we have to put up with. Of course, your interest is with the jobber and retailer alike, and all I ask is that you will think twice before you speak once, and be sure you are right. I think "H. J. P." who wants his "perquisites," had better seek his head. Such jewelers ought to be prohibited from getting goods. It is simply disgusting to see how they have done the trade more injury than sending up price lists have ever done. E. M. C.

[Our correspondent is correct in saying that any jeweler has a right to refuse to buy goods of a jobber whose practices he does not like. But while an individual has this right, a dozen persons have no right to combine together to injure the business of a man whose practices are not in violation of law. When they do so combine, it becomes a conspiracy, and persons joining in such conspiracies to injure the business of another, have been sent to State Prison before now. We do not uphold the jobbers in sending out catalogues and price lists to persons outside the trade—no one has denounced such practices more vigorously than we have. But the fact remains that such practices are not in violation of law, while the attempt to injure the men who do it is in violation. Our purpose in what we wrote was to caution the dealers against going to extremes in publishing a black list, and rendering themselves liable to a prosecution for conspiracy. No amount of bravado will change the nature of a conspiracy to injure another, and the law will take cognizance of all such offenses.

ROLLED-PLATE GOODS.

To the Editor of the Jewelers' Circular:

I was much pleased with your article on Rolled-Plate Goods in the last CIRCULAR. I have never heard it spoken of before, but have noticed it myself for quite a while back. It is simply scandalous to say they are first-class goods, and that they are better than the goods made by the first-class chains, and I have seven of their make that I bought of a first-class house, and there is no one of them that I can recommend. They lay side by side with chains that are only gilt, but they are polished entirely through on many places. When one of them, and they don't look as well as the gilt chains. I have tried hard to find better goods but don't succeed to my satisfaction. I have exchanged one, and the second one I received was just like the first. You there are still manufacturers who keep up their standard. You will greatly oblige me if you will give me their addresses. W. W.

[We do not feel at liberty at present to give the names of the manufacturers we have in mind who make rolled-plate goods in accordance with the old standard. There are such, however, well known to the trade in this city, and dealers have no way to compare samples to ascertain at once who make the genuine rolled-plate goods and who the bogus. Manufacturers, however, may well take the hint from the above. There is a legitimate field for a good quality of rolled-plate goods, but it never can be occupied by the manufacturers of the "cheap and nasty" quality. This may do well enough for the outside trade, hardware merchants, barbers, and dealers in gentlemen's goods—but it cannot satisfy the requirements of the retail jewelry trade. At a future period we may feel inclined to name those manufacturers whose goods are of the best quality, but in the hope that all will abandon the cheap style of goods, we refrain at present from making invidious comparisons.—Editor.]

To the Editor of the Jewelers' Circular:

ROLLED-PLATE GOODS.

I see in THE JEWELERS' CIRCULAR an article headed "Rolled-Plate Goods." You say there are manufacturers of such that make make as good goods as ten years ago, and maintain the old standard. Will you please tell who they are, so I can get goods that can be relied on? There are a good many good, honest jobbers now, that say their goods are the best rolled-plate made, and will give satisfactory evidence of it. But they are not so used to be that we could safely warrant such goods for five years. Does anyone make a rolled-plate vest chain that will wear ten years now? If so, I want to know. Certainly they can get price enough to pay as well as for cheap goods. Let us find out the confidence of the goldsmith. There is a splendid business now to build up a trade that will substantially pay if we can get goods we can stand by. There are vest chains in the market now with the maker's trade mark on the swivel, but I don't think they will stand like the old standard. J. W. W.

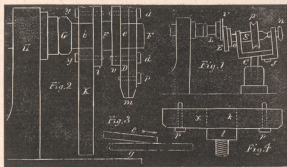
P. S.—Does anyone make the tools shown as new measuring tools, on page 215 of CIRCULAR?

[Our answer to "W. W." above, must suffice as a reply to the first inquiry of "J. W. W."—Editor.]

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

THERE is another style of finish for stem winding wheels called raying; this is done in the lathe. The wheel to be finished in this way is cemented, or better, soft soldered to the face of a chuck, and a small emery wheel is made to revolve rapidly against the face. At Fig. 1 is shown a little device which goes into the tool post socket of an ordinary foot lathe for doing such work; it is shown about one-half the actual size. *S* is a short spindle; *p*, a pulley; *n*, a step screw; *a*, conical bearing; *j*, screw which holds the two cheek pieces together; *C*, a stub which goes into the socket for the tool rest. The spindle *S* is turned by a band from a counter shaft. The chuck *L*, and wheel *w*, are supposed to be in a lathe; but all the usual ideas of a lathe are here reversed, for the spindle or lathe arbor to which the chuck *L* is attached, turns very slowly, (about half as fast as the axle of the first wheel) while the arbor *S*, goes at an intense velocity—the emery



wheel should have at least 100 revolutions to one of the chuck *L*; indeed, the spindle *L*, should have at least 200 revolutions a second—12,000 a minute. The arbor *S* should be set a little obliquely to *L*, so that just one edge of the emery wheel *E* touches the face of the wheel *w*. The wheel *w* should turn from the emery wheel. The emery in such a wheel should not be too fine—about equal to $\frac{1}{2}$ emery paper. A copper wheel charged with diamond dust is best, but emery if run at a very high speed answers. The direction in which the chuck *L* turns can be changed, and the emery wheel applied to the opposite side of the wheel *w*, to change the appearance of the work; but all this will soon suggest itself to the reader, as well as the manner of getting the relative velocities to the spindles. In my last article I described the manner of making cutters for cutting teeth in wheels. I will give now a description of a dividing and cutting attachment which can be used with any foot lathe, and the reader can easily make it himself and have it as accurate as he has a mind to, at a very trifling expense of time and money. The great essential in a cutting engine is accuracy of the divisions. I will first describe a method by which a very near approach to perfection may be reached; say, to less than one minute of a degree of error; this is less than 1-10,000 of an inch on any watch wheel, and 1-2,500 on a wheel for a French clock. In the cut an American lathe is shown, but any live spindle, (or foot, as we are more generally called) can be used. The first step is to procure a wheel of 96 teeth and 3 inches in diameter. These can be bought already cut at 50 cents apiece, of Goodnow & Wightman, 176 Washington street, Boston, Mass., or of Tallman & McFadden, 607 Market street, Philadelphia, Pa., and many other dealers in fine tools. The class of wheels I refer to is known as "Standard Machine-Cut Gears." Turn a chuck as shown in Fig. 2, using brass wire or rod $\frac{3}{16}$ of an inch in diameter, as the wheel you are using has a hole $\frac{5}{16}$ of an inch—these wheels have a hub which should be filed off. In the cut at Fig. 2, the upper portion of the wheels *D* & *K*, are represented as broken away; this is done for the sake of space. The cut in Fig. 2 is full size, and measurements can be taken off with the dividers. Two thick rings of brass are driven on the chuck *F*, and fastened with soft solder, these are shown at *v* & *i*, and are securing the wheels *K* and *D* to; *i*, is turned flat and true on the side next the

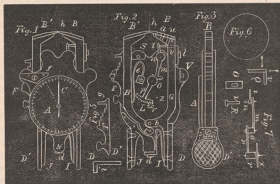
wheel *K*. The part of the arbor *E* at *h*, is next turned to exactly fit the hole in the wheel *K*, (5-16). Screws *y* & *y* pass through the wheel *K*, and are tapped into the collar *i*; there should be four of these screws at equal spaces apart, to firmly hold the wheel flat against the collar *i*. The part of the arbor *F* at *c*, should be of the same size as *h*, (5-16). The wheel *D* is secured to tie collar *n*, in the same manner as described. It is of first class importance that each wheel should run perfectly true and flat. The wheel *D* is 1-9-16 inches in diameter when finished, and must be made with great care, as it is to be the parent and standard of all the divisions you obtain in your cutting machine. The object in making this wheel is to secure accuracy; this is to be obtained by using a wheel of a certain size with a definite number of teeth, and the wheel double, so one error (if any) will correct another. To make the wheel *D*, take two discs cut (by sawing) from hard No. 14 sheet brass; these discs should be roughed out about $\frac{1}{16}$ of an inch across, and scraped flat. To do this is a little out of the line of work generally done by watchmakers, and will consequently need a description of the process. To scrape anything flat, you will want a face plate which is perfectly true, to correct your work by; about the most convenient thing for this is a plate of thick plate glass six or seven inches square, depolished by grinding one side with a small piece of the same glass, and emery and water. Most watchmakers have such a piece of glass, but as a rule it is anything but true and flat, as it gets worn out of true by use. Extra thick French glass plate is very true; in fact, true enough for any ordinary purpose; but while we are on the subject, we might as well describe a method for remedying any imperfections and producing a surface absolutely flat. Procure three pieces of extra thick ($\frac{3}{16}$) plate glass of the size mentioned, and number them 1, 2, 3; grind first 1 and 2, together, then grind 2 and 3 together. To illustrate, suppose the face of No. 1 to be slightly convex, and No. 2 slightly concave; if No. 3 is ground with No. 2, No. 3 must be slightly convex. Now, if No. 1 and No. 3 is tried together, they will not agree, as both are slightly convex; but if the plates are ground alternately together until the three surfaces agree, they must all be perfectly flat. But one plate, if carefully ground and not used for everything, will be accurate enough. A scraper can be made of an old bench file, by grinding the teeth out and the end square, so it presents a clean, sharp right angle all around; such a scraper is shown in Fig. 3, in which *c* is the scraper, *g* the disc (or other job) to be scraped; it is held at a slight angle and pushed as shown by the arrow. Take some red lead and olive oil, (or clock oil) and mix it like thick putty; smear some of this on your roughened glass slab—not a thick coat, but just enough to stain or color the surface; now rub one side of one of your brass discs on the glass, (not bearing on heavy), and the highest places will of course touch the glass and become stained. Scrape off these places with the scraper just described; repeat this process until the whole surface of the disc touches. We have one surface now true; the next thing is to get the opposite surface not only true, but parallel. To do this we must have recourse to our lathe, and prepare a special chuck with a flat face. A piece of brass wire like the chuck *F*, should be prepared as shown at *u*, Fig. 4; tinning with soft solder the part *k*, cast type metal (old type) on and make a face plate as shown at *x*, Fig. 4. The plate *x* should be $\frac{1}{16}$ of an inch thick; turn off the face true and flat, test by the glass slab. The disc should be drilled with four holes about $\frac{1}{2}$ an inch from the center for fastening them together; one of these screws is shown at *p*, Fig. 2. Four screws (*p*) through the type metal face plate *x*, will hold the brass disc until it is turned true. Of course it will be understood that the side of the disc first scraped and flattened goes next the type-metal face plate. After the two discs are prepared true and flat, they should be secured together with the four screws *p*; these screws only hold the two discs together, the screws *d* fastening them to the collar *v*, if the work is done as it should be, after the edge of the two discs are turned off, they should turn perfectly true and flat on the arbor *E*. The center hole in these discs should be a little tight on *c*, but ground to fit by putting some oil-

stone dust and oil on *c*, and revolving it in the hole. The discs should be turned to the shape shown at *m*, Fig. 2, on the edge, and each of exactly the same thickness. The combination wheel, as we shall now term the united discs, must be exactly one and nine-sixteenths of an inch in diameter. Get a 4-inch Brown & Sharp steel rule, graduated to correct divisions; it will cost fifty cents, but it is necessary. The object in making the wheel *D* double, is that as soon as the teeth are cut, the screws *d* and *p* are removed, and one disc is turned just half way round, and the screws restored; now, as there is to be a worm screw working into the teeth of the wheel when done, one error must correct another. In my next I will continue the description of this system, and follow with a simple plan which anyone can easily make at an expense of three or four days' labor and as many dollars—this kind will cut good gear, quite as accurate as most so-called fine watches; but with an instrument constructed with a double division wheel, one has the satisfaction of knowing that he can cut a wheel of any number of teeth, and if they are not absolutely perfect they are closer than he or any other man can with present means measure.

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

THE micrometer callipers mentioned in my last article is illustrated in the accompanying cut. Fig. 1 shows the tool complete; *A* is the indicating dial divided into 250 divisions; *C* the indicating hand. In using this tool, the pieces *D D'*, are grasped between the thumb and finger, and on pressing them together the jaws *B B'* open, and the pivot is inserted, when the jaws are allowed to close on it; and the hand on the dial indicates the size to the ten thousandths of an inch. The jaw *B* (although opening wider) will meas-



ure exactly 1-40 of an inch. I might as well say here that practically, it will make but little difference whether a piece 1-40, 1-39, or 1-41 of an inch thick will produce a complete revolution of the hand on the dial; but whether the measure is constant and reliable in comparison, that is to say, will a pivot which to-day measures 38 divisions on the dial, do the same to-morrow and six months hence? I answer yes, emphatically, if the instrument is carefully and accurately made. To any person

who would like to be exact, I would say, send to either of the firms named below, and get a piece of steel one inch long and 1-16 wide, ground exactly to 1-40 of an inch thick: Darling, Brown & Sharp, Providence, R. I.; Betts Machine Co., Wilmington, Del. My advice is to get at a 1-40 as near as you can, and make the instrument as directed, and it will in every way be as good as if you paid a high price for a piece of steel of no real use to you. At Fig. 2 is shown the instrument with the top plate and dial removed; this shows the interior arrangement and parts in detail, of the exact size and shape. The one here shown is a trifle larger and heavier than the one men-

tioned in previous article; it is also a more complete tool, having both jaws movable. Fig. 3 is an edge view of Fig. 1. The piece *G*, Fig. 2, is made of No. 12 hard brass, sawn and filed into the shape shown; the brass should be made perfectly flat before working into shape. At *B* is shown a steel piece which forms one of the measuring jaws proper; this is hardened and ground into exact shape and attached to *G* by the screw *a*, and two steady pins as shown. The opposite piece *H*, is very similar in shape, but extends back only to *c*; while *G* has a tail piece extending to *I*. The piece *J* is not movable. *H* has a stud jaw exactly like *G*, shown at *B'*. At Fig. 4 is shown the form of a plate (*L*) made of No. 26 hard brass; there are two of these pieces, and they serve as plates for holding the parts together. To understand the working of the parts so far described; suppose one of the plates *L*, to be in position as shown in Fig. 2; the pieces *G H* turn on the pins at *b c*; the piece *J* is attached to the plate *L* by two steady pins and a screw at *N*, Fig. 1. This screw extends from plate to plate through *J*, tapped in the lower plate. A feather spring secured to *J*, by the screw *d*, works against the tail piece *I*, and closes the jaw *B*, after pressure has been applied to *D*. At *e*, Fig. 2, is shown another feather spring; the office of this spring is to throw the piece *H* away; and open the jaw *B'*. To check this motion at such points as we desire, we use the step-shaped piece shown at *F*, Figs. 5 and 2. To illustrate how this is done, suppose a pin put through from plate to plate at the position designated by the dot near *k*, Fig. 4; and the step-shaped piece (*F*), inserted between the piece *H*, and the pin just described; now as the feather spring *e* has a tendency to throw the jaw *B'* from *B*, the jaw *B'* can be stopped at five positions by the five steps in the piece *F*, and if these intervals correspond to 1-40 of an inch, it makes the callipers capable of measuring 6-40 of an inch to the same degree of accuracy that we can measure the first 1-40. A better fixture than the supposed pin is shown at *f*, Fig. 5; its positions are shown at *F*, Fig. 1. At *t*, Fig. 5, is also shown an edge view; the surface over the letter *i*, which comes in contact with the step-piece *F*, should be hardened and ground flat; and should also have a screw and steady pins as shown in Fig. 1. Now we come to the part which works the index hand. You will need two 8-tooth wheels of the size shown at Fig. 6; and two ten-leaved pinions to match the wheels. These wheels are cut and reduced to the form shown in Fig. 2. One of these segments (*m*) is mounted on a staff (*n*); this segment needs but five teeth; the other segment *p*, should have eleven teeth, and is mounted on the pinion *r*; this last mentioned segment (*p*) works in the pinion *r*. These segments and pinions are set in a train as shown in Fig. 2; and also in an edge view in Fig. 7. The staff *n*, on which the segment *m* is fastened, has a finger something like the impulse finger of a duplex; this finger is shown at *t*. At *t*, Fig. 2, is shown a plate and screw head; dotted lines extend across the piece *G*, at *v*, and continue until they come in contact with the finger *t*. This piece is shown in three positions at *O Q R*, Fig. 7. *Q* shows the piece as seen in Fig. 5, *R* as if seen in the direction of the perpendicular arrow; *O* as if seen in the direction of the horizontal arrow. The use of this piece is to strike the finger *t*, as the jaw *B* closes. It will be seen that a very slight motion of the finger *t*, will cause the pinion *r* to revolve considerably; and it will also be seen that the nearer to the arbor or staff *n*, that the piece *v* strikes, the greater will be the motion conveyed to the pinion *r*; the screw *u* controls this, as is evident; this should be tapped through the brass piece *G*, but should not touch (to influence) the jaw *B*. A small oblong hole permits the piece *v* to pass through *G*. The screw *i*, passes through an elongated hole as shown at *O*, Fig. 7, to permit the piece *v* to be moved. On the pinion *r* is mounted a hair-spring collet and hair spring; the use of this hair spring is to hold the finger *t* against the piece *v*. This hair spring is shown at *x*, Fig. 7. The top plate *L* is turned out to the size of the hair spring as shown at the dotted lines *xy*, Fig. 4; *y* shows the position of the stud which is fastened to the lower side of the plate. The coils of the hair spring lie immediately under the dial. The upper pivot of the pinion *r* has its bearing (pivot hole)

in the dial c . The hair spring x is adjusted up to the tension of a about $\frac{1}{2}$ a turn. When the arm of the segment p , rests against a pin shown at s , Fig. 2; this pin is put up through the plate and when the arm of the segment p rests against it, the hand on the dial will stand at the dotted line, Fig. 1. Now let us see if this train and hand arrangement is understood; we will suppose the tool complete; we press on D , until the jaw B opens; as the pin G recedes, the finger t follows the piece v , being impelled the hair springs, acting through the train shown in Fig. 7, the finger follows v , until the arm of the segment p strikes the pin s : (the hand on the dial is now at the dotted line). The jaw will continue to open until G strikes the block at V , Fig. 2. The jaws $B B'$ will now be open about 1-16 of an inch, (to this width for convenience). If now we let them—the jaws—close slowly, the piece v will first strike the finger t , the hand C will begin to move, and when the jaws are exactly 1-40 of an inch apart, the hand C will have moved forward and stand at zero as shown; continue closing the jaws, and the hand will indicate intervals of 1-10,000. The feather spring held by the screw d should exert a force of about four ounces; that is, if the instrument was placed as shown in Fig. 3, it would require a four-ounce weight, laid say on a screwdriver applied at opposite the letter D , to overcome the force of the spring. The feather spring c need not be more than one-half this strength. At F , Fig. 2, is shown a block of brass for holding the plates apart; this is riveted to the lower plate with two rivets, one on each side of the screw hole shown—a little soft solder in addition is not misplaced, scraping off all that appears on the outside the joint. There is another piece of the same size and shape at s . These pieces, as well as the piece f , should be a trifle thicker than the pieces G and H' ; this is to let the last named pieces turn freely. Bushes should be inserted in the holes b c , and allowed to protrude slightly on each side to prevent $G H$ from rubbing the plates. The pieces $D D'$ are as well made of pearl as anything; it is light and hard and can be engraved as shown to give grip—two screws to each hold them firm. The method of grinding the jaws $B B'$, and the step piece F , as well as dividing the dial C , is necessarily deferred to my next, also description and cut of a jewel gauge which forms a part of this set. The jewel gauge is very simple and complete. I cannot help urging on every young watchmaker the importance of making such a calliper as I described. It is by no means a very very serious job; three or four days will do it; and my word for it, in one year you would not be deprived of it for a trifling sum. In the cut, of course, such fine divisions as $25''$ would not show without great pains; but in a metal dial the divisions are a trifle finer than 1-100 on a steel rule—easily seen with the naked eye, and with an eye glass half a graduation is easily judged. I would call attention to a slight slip of graver in cutting the outlines to the piece f , Fig. 2, a little to the left of the letter c . The piece f is solid; extends from the letter d nearly up to the step piece F , then down to f .

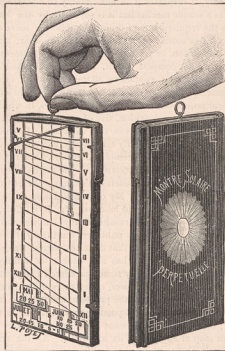
IN 1847 Godfrey Luther and his son were engaged in gold mining on Wilson's branch, in what is now Wilson's district in this country. Their appliances were of the rudest kind, consisting of sluice and rifle boxes and the traditional miner's pan. On one occasion, Col. John E. Redwine, then a lad of about 16, was sent by his father to Mr. Luther's works to see him about some business matter. While there the elder Luther and some other gentleman walked off some little distance, and he continued in conversation with the young man, who was "panning out" some earth and showing Redwine the gold. In one pan he noticed an exceedingly beautiful pebble, and called Mr. Redwine's attention to it and while they were admiring it the other gentlemen returned, and they also noticed its beauty. The gentleman, without any idea of its value, remarked to the boy, "I'll give you a dime for it." "All right," said he, and accepted it gladly. Some time afterward the gentleman was in Gainesville and showed the stone to Dr. Daniel. That gentleman believed it to be a diamond, but finally paid the gentleman \$30 for it and took the stone. He sent it to London, there being at that time no diamond cutters in the United States, where experts pronounced it a diamond of the first water, and he received for it \$300. It was afterward rumored that it sold for a much larger sum than this, but nothing is known positively of its history beyond its sale in London.—*Gainesville (Ga) Eagle*.

De Combette's Solar Watch.

SUN dials are of two kinds; in one the hour is indicated by the inclination of the shadow, and in the other it is shown by its length. The inventor of the very simple little apparatus represented herewith has chosen the latter mode.

The arrangement of the "watch" is as follows: To the sides of a block of mahogany are affixed four clasps, which serve for holding in place the cards upon which are inscribed the different months. In the engraving, we have the card for the months of May, June, and July. Over the top of the block extends a rubber band which is fixed to the sides by means of rings. A third ring, through which the band passes, serves for holding the apparatus. A steel needle having an aperture at one extremity serves for projecting the shadow on the card.

To use the apparatus, the unperforated end of the needle is placed between the wood and the rubber, on the line of the day of the month. Thus, in the cut it is on the line of the 15th and 20th of June. The apparatus is then held by the ring, and turned to the right or to the left until the shadow exactly coincides with the line. The luminous point projected by the eye of the needle indicates at the right the hour for the morning, and to the left that for the after-



noon. It will be at once seen, on reading the card, that on the 20th of June the sun is at its greatest elevation, and that on the 25th it is at the same height as on the 15th; and that on the 1st of July it is at the same height as on the 10th and 30th of June, etc. The figure to the right shows the apparatus enclosed in its case.—*La Nature*.

THE *World's* correspondent at Mexico reports the discovery of a new Aztec calendar stone. It was found, June 2, by Captain Evans under a dilapidated Indian hut, which stood on the place that once formed the favorite garden of the Texocan "Poet Prince" Netzahualcoyotl. It is a stone slab, eight feet by six, covered with hieroglyphs, and near the center of it is a clearly cut calendar—similar to the far-famed "Aztec Calendar stone" which is now attached to the cathedral in the city of Mexico. The stone goes to the Mexican National Museum. Further excavations are to be made on the same site, and since King Netzahualcoyotl "the Wise" built his palace on a hillcock on which the residence of the sovereign lords of a more ancient nation had stood, it is probable that further researches in that locality may lead to interesting discoveries.

English Watch Repairing,

BY HENRY GANNEY.

IN replacing lost parts of the lever escapement, the repairer had best cultivate the ability to adapt his work to the requirements of the occasion, rather than rely upon any system of gauging, or finding proportions of absent parts from those that remain. However valuable this system may be in manufacturing, it has not been the system on which work has hitherto been produced, and the most exact system of measurement or machine work requires a final adjustment by the eye and hand. No escapement lends itself so well to measurement as the lever, owing to what is in other escapements the delicate connection between the scape wheel and balance axis (by the interposition of the lever and roller) becoming a highly magnified and easily managed mechanical action. In the duplex and verge escapements we find one or two rubs and touches with a polisher and red stuff often make the difference between success and failure in some of the actions of these escapements. As a matter of fact, we have not at present any watch escapement that thoroughly meets all the requirements of a pocket timekeeper, but the lever appears to be the best compromise; though inferior to the chronometer as a timekeeper only, it surpasses it in non-liability to disarrangement or injury, and as a simple mechanism it is surpassed by the horizontal, which meets the requirements of ordinary public use more economically, and with less motive power and consequent wear; and where smallness of dimension, or price of production, are elements of success, the lever cannot compete with it. I think it still possible to produce a watch escapement, containing all the elements of success as a watch escapement, as well as the chronometer escapement answers all the mechanical requirements of marine timekeepers, in which capacity non-liability to external motion, size of mechanism, and price of production simplify the demands in that direction. In clock work, the escapements in use are perfectly satisfactory, and no errors attributable to them interfere with contemplated results. As a stimulus to invention, the more perfect appreciation of the merits and points of existing escapements, it may be useful to examine the requirements of a perfect watch escapement. My own thoughts were directed to this subject by the inventions and labors of Mr. J. F. Cole, and at some future time I will give the results of my studies and experiments in new watch escapements publicly; but it may be accepted as an axiom that no escapement that does not possess almost primitive simplicity in its mechanism has any chance of finding favor; and in this respect the lever is by some considered a step backwards, and in requiring more motive power, owing to extra mechanism, sins against the first requirements of the problem, and throws it out of use in small work. The smallest possible motive power is the first requirement; the second requirement is the non-liability of the balance to set or stop at any part of its excursion. As the tension of the balance spring is the power that is relied on to return all balances (except in the verge escapement), considerable excursions or large vibrations are necessary that it may be excited, and where the spring ceases to pull the balance the motive power of the train must commence propelling it. This, which is perhaps the most essential requisite of watch escapements, is fully met in all well-made horizontal and lever escapements, and accounts for their supplanting the duplex and chronometer, which possesses higher capabilities as timekeepers; but if the energy of the balance is neutralized by external motion, the balance does not vibrate a sufficient distance to unlock the motive power, which being applied in one direction only, doubles the distance and difficulties under which it is applied. In the horizontal and lever escapements, half the motive power of the escapement is used to drive the balance into action with the other half, and the various actions to effect this constitute the merits and evils of these escapements.

In common with most specialists, watchmakers are inclined to value their productions by the difficulties they overcome in producing them; in this respect they err, I think, in attributing superior

timing properties to highly detached lever escapements. I can find no mechanical warrant for this assertion, or for the usual practice of making high class work with low angle pallets and small arcs of lever vibration, and common work with larger angle pallets and lever motion. Common work is made thus, as easier to execute, and more reliable in its mechanical action, and I fail to see in what direction timekeeping efficiency is sacrificed thereby, and think the same quality of work applied to the larger angle escapements should produce equal, if not superior results. I am aware, in advancing this view, I am in opposition to all the leading authorities—including Herr Grossmann, who recommends the higher detachment as promoting fine timekeeping—and shall be obliged for a demonstration of the fact, though not by quoting other authorities and practitioners in the horological world. My own text-book of the mechanical facts of watch work have mostly been works on the steam engine, and, though giving all due value to horological experience, am not disposed to accept as valid any mechanical ideas that cannot be referred to some such palpable standard. All authorities agree that a gentle continuous force applied to a wheel in the direction in which it is traveling, is more effective than sudden blows, which mostly recoil upon their source. Anyone with a lathe at work can illustrate the value of the principle of higher detachment by short jumps on the crank, and note its effects in contrast with the usual continuous pressure. It is usually claimed that the various parts of the escapement being in contact such a short time, in the low angle escapement, the friction is reduced in the same proportion. Nothing can be more erroneous; the longer time taken to traverse the larger arcs only represents the larger surfaces in contact, and friction is proportional to the pressure applied only, and not the size of surfaces in contact—as was well shown in the science class at the Institute some time back, where it was demonstrated to all present, by experiment, that a small surface supporting a weight required the same force to overcome the friction of the plane on which it moved, as another surface twenty times larger supporting the same weight. By concentrating the action of the lever pallets we increase the friction on the holes at certain parts, and lose the power derived from the balance spring in overcoming the unlocking, its effectiveness being in proportion to its distance from the reposing center. In this matter the ear has deceived the mind, and the superior beat of the small angle escapement has led to its being credited with qualities it cannot be proved to possess, and causes the abandonment of the very principle on which the lever escapement rests, viz., extension of parts and ease of manipulation. No apology, I think, is needed for introducing these rather dry details to the watch repairer's notice, who, unlike most other workmen, is required to think more than work—much thought and a little work brings him success, but much work and little thought will involve him in never-ending trouble. Knowing the points of a good escapement, he will discover how many of them can be developed from the work in hand, and what errors eliminated. No rules can be given, as what will restore in one case will ruin in another. The repairer may look upon the two pallets that give motion to the roller and balance as one pallet divided for the convenience gained by driving in both directions, and do all in his power to enable the wheel teeth to travel up and down the planes with as much ease as the circumstances permit. There is a certain amount of recoil on the scape wheel and train at the time of unlocking, and all available means should be used to make this as small as possible, consistent with safety of the action, the function of the roller being to disengage the lever from the locking and allow the wheel to travel along the impulse plane. The roller and pin are the recipients of the power they have put in motion, and, if properly proportioned, disconnect their action with the lever immediately after it ceases to propel them. Should a roller be lost the lever may be put in the frame, and a point of the pinion gauge placed in the jewel hole and opened until the other end of the gauge is in contact with the guard pin pushed on one side as far as the banking pins will allow; this will be the size of the roller from its center to its outside edge roughly.

When turned and fitted on the staff, one of the banking pins may be bent out somewhat, and the lever resting against it, the balance and roller may be put in, but not screwed down until the roller has been turned sufficiently small to allow of fair shake, with the banking pin quite right. Then a hole as near the edge of the roller as possible to be sound must be drilled and opened, same size as the roller notch; if the escapement is a common one, with a long notch in the lever, the pin may be a round one, and the action in and out the lever will give little trouble. If the escapement is a fine one the crescent should be formed by a round punch held against the edge of the roller where the hole is, and the edge driven in with a hammer. This will close the hole, in which a flattened pin must be fitted, and the final tests of the action of the pin must show that it does not leave the lever notch until the pallets have ceased to move, and is quite free, when in action, of the bottom of the lever notch, which it must fit without sideshake, or impulse will be lost.

The lever, though giving the name to the escapement, is the least important part of it, and transmitting the power from the wheel and pallets to the roller and balance without loss is its chief function. If lost, it generally disappears with the pallets, and it will be poor economy to endeavor to use the old pallet holes to new pallets. After stopping up the old holes the depth tool must be used to pitch the new ones, a small arc being traced on the brass plate with the point of the depth tool, after removing the wheel and pallet from it, when a proper depth has been found, the requirements of which have been already indicated. The acting length of lever is generally three times that of the roller, the mechanical action being equivalent to a wheel of thirty teeth working with a pinion of ten, the roller pin doing duty as one leaf of a pinion, and the lever notch as the sides of two wheel teeth. There is no principle involved, only convenience, it being usual to multiply the motion of the pallets by three; and the size of the lever and roller, like that of wheels and pinions, is a matter of convenience also, though if certain results are required, certain proportions must be maintained. The lever on the pallets performs the same office as the crutch for the clock pendulum, and angling the escapement by shifting the lever, so that it moves the pallets the right distance each way, when in contact with the ruby pin, is the same as putting a clock in beat by the crutch, and must be tested in the same manner. The depth of the lever and roller is obtained by placing them in the depth tool, and seeing that the roller pin acts freely in the notch, and that the action of the guard pin is correct by passing freely in the crescent, and sound in its action in refusing to pass the roller when out of the crescent, and that the horns of the lever prevent the guard pin from getting in the crescent when turned right round. Upon removing lever and roller another arc must be traced on the plate across the one giving the wheel and pallet depth, with one center of the depth tool placed in the hole from which the balance staff jewels have been removed, and where the two circles intersect, a pointed center or drill must make a chamfer, through which a hole must be carefully drilled for the pallet staff pivot. The lever notch should be finished after this is done, as delicate alterations can now be best affected and secured and final adjustments made, and the lever secured to the pallet by a pin through pallets and lever, drilling the hole in the pallet first and then in the lever through it, after angling it, or finding its correct position in relation to the pallets, by moving pallets or lever right or left. It is usual to arrange the escapement so that the pallets lie tolerably straight along the lever in most watches, but in fine foreign watches the lever is in straight line, or across the pallets, after the manner of clock pallets and their crutch and pendulum. One way is as effective as the other, though in the usual method, the hole wears at one corner and becomes long, whilst in the straight line the pressure is more equally divided by the various actions on the pallet hole.

A thorough mastery of all the difficulties incident to watch repairing can only be acquired by a thorough conception of the correct theory of the escapement, and the variations from it which occur in actual practice, and the manner in which one error is made to com-

pensate another. Owing to the microscopical character of watch work, true theory has often to yield to practical necessity, and we are beginning to realize that the simpler forms of watches give a satisfaction too often denied to the more complicated. Complication and dissatisfaction being, in this art, convertible terms, and the demand for competent artists who can secure results of a definite character, always great and never likely to be satisfied, give the repairer an opening for study and ambitious practice without limit. The varieties of the lever escapement are not very great, and the ordinary escapement is considered by many to supply a greater amount of general excellence than any other. Its varieties—the double roller and Savage's two-pin lever—possessing merits for special purposes, have also special troubles to which the other is not exposed, in the shape of extra weight and extension of lever, and the delicacy of the action between the roller and impulse pin, in which we see the same difficulty that exists in the duplex impulse, the roller or pallet having first to pass freely by the pin or tooth that impels it. We have to choose between two evils—want of freedom and shake between the parts, or loss by drop as contact is made with roller and lever. Detaching the unlocking and impelling actions though perfecting the theory of watchwork, is fatal in practice; and the success of the lever and horizontal is based on the fact that the impulsion is a continuation only of the unlocking action, and the continuous sliding action from one to the other is the great merit of such small mechanism, where the same necessity for freedom, side shake, and end shake exists, as in the largest machines, which only require the same, and where the effect on their actions is nil.

In the duplex escapement the amount of necessary drop, to ensure a safe action of the parts, wastes fully one-third of the power employed; and as this is an escapement that gives considerable trouble to the repairer, a study of its requirements may be useful. It is, though a most perfect watch escapement theoretically, a succession of drops, and—happily for all concerned—is nearly dropped by the public; and as much practice with it is not likely to fall to anyone's share of experience in repairing, a theoretical study of its requirements will enable the repairer to master its difficulties. To some it is a trouble to find the right position of the hair spring, or to put it in beat, though this is an illusory term, with an escapement that only beats one way, and has a recoil in the opposite direction. The usual position for the spring allows the notch of ruby roller to stand in a straight line to, or exactly opposite, the scape wheel arbor. In this position, the same amount of motion of the balance in either direction brings the tooth in or out of the notch, and commences the action of the escapement. A very easy action of the tooth in and out the notch is essential, and the tooth must never fit tight in the notch at any part of its action; if worn blunt and the depth shallow, it must be thinned from the back, and the depth made deeper by a slight alteration of the cocks; this will also necessitate, perhaps, shortening of the pallet, which must be repolished to its original form, so that it is free of the impulse teeth when not acted on by them. A considerable drop, from four to ten degrees—according to the proportions of the escapement—is necessary for the safe action of the impulse, as the tooth drops safely up the pallet only with a large drop. The amount of drop, after the tooth leaves the pallet, is only required to be sufficient to insure freedom for the pallet in returning past the impulse tooth. Some have an idea the drop on the pallet is given to insure the impulse by a sudden blow; this is not so, and all drop is wasted power and injurious shock to the escapement, but it is necessary, to prevent the tooth and pallet butting instead of engaging. Extreme rigidity of parts, small pivots well fitted to the holes, with smallest amount of side shake and end shake, are necessary with this escapement more than any other. In replacing the ruby roller, should the long teeth be damaged, a roller a size larger will facilitate the actions and allow the teeth to be topped and trued; the roller is secured on the arbor with shellac, the arbor itself being turned to a long fine pivot that runs through the ruby roller, which it must fit as loosely as seconds

pivot does its hole, and when in the turns some liquid or heated shellac is applied, and being revolved with bow and ferrule ere it sets, is lightly touched with a point of peg wood, so that it sets perfectly true and firm on the arbor or pivot. The long fine arbor or pivot constitutes the difference between this staff and others, and none but good pivoters can succeed with it. When the impulse pallet is jeweled, alterations may be made by warming the pallet and shifting the acting length of the jewel in or out. Much trouble may be saved if the balance cock fits loosely, by slightly expanding the steady pins with a light blow with a hammer on their ends; a common practice of squeezing steady pins with pliers is atrocious. Much time is spent in polishing the duplex wheel in the making of English escapements, which invariably have brass wheels, and a day can be consumed in polishing and finishing a duplex wheel which for practical purposes is best as it comes from the cutting engine. Duplex wheel cutters represented the highest development of ability in this art in England some years since, and I believe there are none at present living who follow the occupation, but duplex wheels can readily be obtained at foreign material dealers that can be adapted to most requirements. The same may be said in connection with renewing the English horizontal watch, of which some fine specimens are often put into the repairer's hand. Wheels and cylinders adapted to English requirements can generally be obtained from our obliging and enterprising Swiss friends, and old relics that have done duty a hundred years past, with economy, receive another lease of usefulness.

Under these circumstances, making an English cylinder seems a work of supererogation; but the amount of patience and skill that can be exhibited in all the operations that constitute watchmaking excellence, should induce the attempt, as no other single piece combines so much drilling, turning, fitting, filing, and polishing, as the horizontal cylinder—the only undisputed English escapement—and the Turners' medal might be fairly claimed by the producer of a good one. It seems to be understood that competition with the Swiss in the horizontal is impossible. Competition is not necessary; but an English popular watch, with going barrel and horizontal escapement, in a full-plate frame, and ordinary English case, by reason of their superior strength and cleanliness, would give a good return for capital, without any extraordinary effort. The jobber who desires to make an English cylinder may commence by finding a cannon pinion, and save the trouble of drilling a long hole in a piece of steel wire by so doing, and open the hole until it admits a tooth of the wheel into it. The end of the cylinder is the largest part of the taper the hole receives from the broach, or the plug for the bottom pivot cannot be fitted from the outside. The next operation consists in turning the cylinder or an arbor until it passes between two teeth without shake, as polishing will give the necessary freedom, which must be tested by hand or in the depth tool during the operation of polishing, of which more anon. When the cylinder is turned to the right size and length, which may be gauged from the old cylinder, which, if broken, may be put on a piece of wax to hold it together; a polisher of iron and oilstone dust is applied to smooth it all over, and a soft steel arbor is put inside the cylinder, and being charged with oilstone dust and oil, two ferrules are used, one to rotate the arbor and the other the cylinder, to smooth the inside; a piece of brass wire is next fitted to hold the cylinder whilst being cut. Three files are required—a smooth square one, to cut the great opening, which is not quite so deep as half the circumference of the cylinder; a thin banking slot file, with smooth sides and cutting edge only, for cutting the slot that frees the wheel for banking; this slot is cut through half the remaining circumference of the cylinder. A small file for making and rounding the lips must be obtained or made, and it must be curved at the end to allow of entering the cylinder, as the edges correspond to pallet. Their proper formation is of great consequence. The first, or entering lip, requires simple rounding after the manner of a pin; but the second, or leaving lip, requires rounding only on the inside, with a curve that only meets the outer edge of the cylinder smoothly, or the impulse of the tooth

will be wasted at its most effective part. Polishers of iron, corresponding to the files, must now be used with oilstone dust. The cylinder is hardened by holding it in the flame with a piece of wire until it is cherry-red, and then plunged in oil; a little soap on the cylinder will cause it to harden white, and holding it with tweezers across the slot with a piece of wire to the end it may be blued at both ends, leaving the middle quite hard or very slightly tempered.

The outside of the cylinder must first be polished, on an arbor perfectly true, with iron and bell-metal and red crucis, leaving the part that holds the balance collet rather taper; then the inside must be finished on a loose soft steel arbor, filed and charged with red stuff, holding the cylinder in a ferrule so that the back inside is well polished first, or it will polish most on the open side, and finish off by rotating it on an arbor of brass and fine stuff. The polishing of the lips or edges will be the last and most difficult operation, and must be well done. The fitting of the pivots or plugs may be in the old style of steel center and brass plug, or the modern style of steel plug only. With hard cylinder and highly tempered steel for pivots, the brass plug is easiest and safest. The other operation connected with pivoting the cylinder are identical with pivoting a staff with conical pivots, and need not be entered on here; if the cylinder has been properly made, and its position correct, with freedom for the wheel, its action may be depended on. The banking pin is required to stand in the exact center of the action of the two impulses, for safety rather nearer to the leaving lip; if too near it will cause the wheel to recoil, by allowing contact with bottom of banking slot at the end of the vibration to the right; if too much the other way, the tooth will slip inside the cylinder at the extreme vibration to the left, and stop the watch.

High-Priced Beans.

Tom Watrous, commercial traveller, stopped off at the Marshal, Mich., eating house several years ago.

He was not very hungry and called for a plate of beans, which he received. He inquired the price, and was informed that it was seventy-five cents.

"That's a thundering price for beans," said Tom.

"That's the price," said the proprietor.

The train was just starting; Tom paid the bill, and the coaches bore him and his indignation on toward Detroit.

This was on Saturday. On Monday, Gilmore, the eating house man received a telegram, collect on delivery, \$1.25, which he paid, and read on opening it: "A thundering price for beans."

Thirty days from that date a new express package was handed in to Gilmore C. O. D., who paid 90 cents for the privilege of opening it to discover a lot of sawdust, on the top of which lay a slip of paper with the cabalistic symbols: "A thundering price for beans!"

Two months from this Gilmore was summoned to Chicago to meet a former business partner, and the hotel clerk handed him a letter conveying the pleasant information: "A thundering price for beans!"

During Gilmore's absence his son paid for two telegrams and one express package, directly on the subject of 75 cents being "a thundering price for beans!" Cost of these articles, \$3.80. A genuine telegram from Gilmore's mining share broker advising him to sell was refused, and the loss of it entailed an actual damage to Gilmore of \$1,500.

A year rolled away. Gilmore ordered a case of Mackinac trout from Detroit. They came C. O. D., \$13.85; when opened he found every fish had been removed from the ice and sawdust, and a shingle met his eyes, marked with a blue lead pencil: "A thundering price for beans!" Trouble arose between Gilmore and the Detroit fish house, and they went to law, Gilmore winning the suit, \$25 damages, and all at a cost for the attorney's services of \$86.90.

Gilmore grew dejected. Life looked gloomy. Letters poured in on every one of his family at regular intervals from all parts of the world, bearing the unpleasant information that it was "a thundering price for beans."

At last Gilmore sold the Marshall eating house and moved to Chicago. He carried his deep affliction along with him, gnawing like a cancer at his vitals. The persecution never ceased. Gilmore drooped, faded, and finally died. The terribly afflicted family followed him to his last resting place, and the widow, with what little money she had saved from the expenses of bogus telegrams and express packages, erected a plain marble slab to the memory of the tortured Gilmore.

The following Sabbath the mourning family went out to the cemetery to visit some violet on Gilmore's grave. Arriving on the ground, they observed in silent horror that another legend appeared above the name of Gilmore on the tombstone. It was chalked on a small blackboard, and read: "A THUNDERING PRICE FOR BEANS."

Watch Oil—Care to be used in its Application.

AMONG the substances used by the watchmaker, oil is one occupying a first rank, being of the greatest importance. No matter how carefully has been the construction of a timepiece, its functions are subordinate to the continuous presence of a fatty body introduced into all the parts where friction occurs; without this precaution, the organs in contact would very soon be subject to early wear and destruction, thus producing the stoppage of the mechanism; the same would equally result if the oil employed were to lose its fluidity, and by its solidification seriously interfere with the rate. It is true that there exists no lubricating agent which indefinitely preserves its primitive conditions; all change with the lapse of time. The duration of the correct rate of a clock or watch is consequently limited by the time until the lubricator degenerates; clocks which possess a large motor and small resistance preserve their oil longer. Cases are not wanting in which they kept correct rate for ten and fifteen years, but as for watches, whose motive power is small, the least thickening of the oil in the last moveable parts, occasions a resistance which soon is impossible to overcome, and the watch stops. The timepiece must be taken asunder, cleaned, and fresh oil applied. Its duration does not last beyond one and one-half or two years at most, and these little mechanisms are only in good order when in conditions of having been cleaned at short intervals, so imperfect is the agent used by the watchmaker for lubricating.

It will be seen that a judicious choice of oil must be all-important to him. Watchmakers and chemists have occupied themselves with the question, and more than once the results obtained have, at least in theory, led to the anticipations that the grand desideratum was discovered at last, but practical experience very soon destroyed all hopes—no oil prepared by any new processes has as yet resulted in anything permanent.

Choice of oil.—We will quote M. H. Robert by saying that the best watch oil is made of olives. Some prefer animal oils, notwithstanding its greater viscosity; they find it to withstand the influences of the sea better than that from olives. Experiments have been tried with neats', mutton, even ducks' foot oil, and all, with due care have given good results.

Animal oils are submitted to a pretty high temperature, for extracting, while those from olives should not be heated beyond 50°.

There exists no other means, actually, than a sufficiently long experience for distinguishing good or bad oils. The watchmaker, consequently, is reduced to confidence when purchasing it. The good faith and renown of the manufacturer are his only guaranties. These remarks are specially applicable to olive oil.

It is believed that certain indications will betray the quality, from the manner in which it behaves when brought into contact with brass for several days. It would not be prudent to put too much faith in the presumptions, as they may occasion mistakes.

A good watch oil should have the following qualifications: 1. It must preserve its primitive fluidity for a long time; 2. It must not attack the brass with which it is brought into contact; 3. Possess a good fluidity; 4. It must not thicken on exposure to cold; 5. It must be absolutely free from all glutinous or resinous substances.

Of all these qualifications, the preservation of its fluidity is the most important; of course, no oil preserves it forever, all thicken and solidify with time, and it may be expected that a retardation of rate will commence with the change. Oils prepared by the watchmaker himself may last for three years, and clocks may still continue to preserve a good rate for longer time. Astronomical clocks will go as long as twelve years before requiring a cleaning, but chronometers should never be let go more than three years; watches require to be cleaned every eighteen months at longest.

Brass oxidizes more or less in contact with oil; this will even eat into it, and it assumes a clear green, bluish green, and at times a black color. If these symptoms appear in a pronounced manner, at the end of a short time, the oil had better be thrown one side as unfit.

A fluidity more or less great is of no importance, but it is utterly indispensable that the oil should preserve it without thickening. If attention were bestowed simply to the inconvenience occasioned by the resistance on the pivots, the most fluid would only be used, especially for the latter moveable parts, whose velocity is greater and power less; but we have on this side the fact that too fluid an oil does not keep. Thus, if one too fluid in consistency were used on cylinders, the parts would very soon run dry, but the same kind of oil would answer very well for the smaller pivots, by reason of their greater adaptability to the sinks. The consistency of the oil should therefore be in proportion to the pressure, and a thicker oil will be found better adapted for the first moveable parts. It is rare, however, that the watchmaker uses all the care requisite, chronometers excepted; the same kind of oil is used at all train parts.

Animal oils, being generally thicker, are better adapted for large clocks; they could be well used for lubricating the blade and pivots of the mainspring. Some chronometer makers prefer them to that from olives, and think it is better preserved at sea.

Freezing.—Olive oil shows a very variable manner under the action of cold, even when appearing to be identical in their nature. It is not good to judge of the quality by the temperature in which it congeals. This change of state occurs from 4° to 20°.

Congealed oils neither have the same appearance nor the same state. Thickened oils are more viscid than fresh ones under the action of cold, and offer greater perturbations in the rate than the latter. In general, an oil curdling with an average degree of cold is not objectionable for the first wheels; it suffices it should preserve its fluidity with -4° . The rate of the timepiece is not affected thereby. A contact with metal will keep oil fluid; and it may still be so at the pivots while that in the bottle from which it has been taken has already become congealed.

Many causes contribute to degenerate oil. Thus,

1. The nature of the oil itself. Every oil deteriorates after a while of itself, independent of foreign influences.
2. A contact with the air. The elements in the air combine little by little with it, and modify its nature.
3. An action of light. This influence singularly favors a degeneration.
4. Humidity.
5. A rise of temperature, or an intense cold; in fact, every sudden variation of temperature.
6. Emanations arising either from persons or localities; chronometers frequently deteriorate at sea, and on some vessels more than on others. Some persons are obliged to have their watches cleaned oftener than others.
7. Clocks enclosed in not thoroughly seasoned oak timber; the tannic acid given off slowly decomposes the oil.
8. The nature or composition of the metal or alloy employed.
9. The state of the lubricating surfaces.
10. The kind of friction. A pivot badly rounded or polished, or working in too large a hole, is liable to wear; also a high pressure, etc.

The different kinds of brass do not behave alike with oil; certain ones alter more or less, and are more or less affected by others; simple cast brass is very inferior to the drawn or hammered metal. The same kind of brass even acts differently, in accordance with having been hammered more or less in a cold state.

The gilding of watch trains by means of mercury serves the double purpose of stopping the oxidation and keeping the oil from spreading; it is caused by the graining left by the gold amalgam on the parts. Gold, of all metals, preserves oil best; next to gold, gilt brass. Brass of good quality, well hammered, also gives good results. When simply cast, it alters the oil very rapidly. All other metals tried up to date, copper included, are inferior to brass, as far as regards their oil preserving qualities.

PRESERVATION OF OIL IN THE RUBBING PARTS.

It now remains to examine how oil behaves on objects, and what

precautions must be taken to prevent its spreading. This action, altogether mechanical, is regulated by natural laws, and may be determined beforehand; but these questions appear to have little engaged the attention of artisans, and we are forced to collate them from works of different authors, who have barely spoken of them.

The interior cylinder walls retain the oil well. This fact, favored by the form of the club teeth of the scapewheel, has eminently contributed to the success of the cylinder escapement, and explains in a great measure the universal regard in which it is held. A number of escapements, obsolete to-day, do not deserve their fate, but for the difficulty with which they retain oil. A lack of this is followed by the wear of the rubbing parts; destruction progresses, and the timepiece soon becomes unfit for use, giving rise to frequent repairs. Thus, a service of only short duration is obtained, which of itself is a capital offense of the mechanism subject to many other accidents. The cylinder escapement, if executed on sound principles, will go a long time without wear.

If the scapewheel teeth are pointed, the oil is kept from spreading by filing on the face of each tooth a little groove; it is well to extend it to the other side, it may be cleaned with greater dispatch. The oil tending to run to the wheel's center, is forced to stop at or near the point. Th. Reid, an English horologist, practiced this disposition with success. Others have found it practicable to file a little cleft at the end of each tooth, to serve as sink. Mr. Robert, in his carefully constructed timepieces, pierces each tooth of the scapewheel for the same purpose.

Others make these teeth of concave form; the oil being driven from the two sides finds a place to lodge.

Cavities introduced for the purpose of storing oil at the pivot holes, to lubricate the rubbing parts, are known by the name of sinks. Their forms must comply with three conditions, viz., Maintain the oil at the same place—without running; inclose the largest possible quantity; prevent an exposure to air of the oil.

A certain amount of oil, put into the sink will remain there without spreading; by increasing the quantity, it will run out and the pivot runs dry. Only use sufficient, for fear of running out.

As a contact with air changes the oil and forms a pellicle over it, this destructive agent must be guarded against by offering the least surface possible.

To apply oil intelligently, plunge a clean steel rod into the bottle, and withdraw it quickly; the oil remaining attached thereto is put into the oil cup; and with a little steel staff or drill apply it to the parts; put it exactly to the bottom of the hole, only in a quantity sufficient to be contained within the sink; taking care not to touch it elsewhere, it might call out the other oil, by offering it a facility to run.

Preservation.—It is not sufficient that the watchmaker be provided with good oil, he must seek to preserve it, as follows:

1. By keeping it in shelter, from contact with the air; the bottle must constantly be kept vertical, and it should be long, narrow, and carefully corked. Never tip the bottle to one side, to pour out; let none run on the sides. Let the cork be of the best quality.
2. Keep it in a perfectly dark place, and do not expose the bottle to the light any longer than necessary to take oil therefrom, in the manner prescribed.
3. Keep it under cover in a dry and sweet place; removed as much as possible from all agitations of the air and exposures to sudden changes of temperature.

We have endeavored to elucidate the question, and leave it to the practical experiment of the watchmaker to "change, alter, and amend." Every intelligent horologist will concur in saying that we are not yet by any means in possession of the best lubricating agent possible.

Utility of Drawing in Horology.

A KNOWLEDGE of the art of drawing is indispensable to any watchmaker who does not desire to remain a stranger to the events falling around him, and who wishes to understand the ideas

of others, and desirous at the same time of having his own comprehended by them. It is only by designs that objects and their purposes become intelligible; in default of the object itself its presentation on paper serves to convey a correct idea of its proportions, and if the design is true to nature, he who sees it will be able to produce the identical model, although he has never seen the object.

To inventors, more especially, a design becomes highly important to incorporate the creation of his mind, to examine it in all its bearings, and to modify it in accordance with his taste before putting it into execution. "It is easier," said M. Jolard, "to efface, to elongate and to alter a pencil line than a bar of iron. If the inventor has not sufficiently matured his plan, if he has not made operate each piece by itself, if he has not clearly prescribed the function of everything in his thought before commencing, the inventor will perceive too late that certain parts encounter and perform against each other, or that some are too heavy and others too frail." How much time and money is lost in the premature execution of conceptions the simple representation of which on paper would have at once demonstrated the impossibility of the unfinished conception?

We therefore counsel all those who occupy themselves with the production of novelties: Do not at once commence with the execution, but while your idea is clear and well defined in your mind render it visible to your sight; trace it on paper, down to the smallest details, in order to give yourself a very exact account of all its different parts. This exercise will assist your memory, and you are thus enabled to change and correct entirely at your ease, without any other sacrifice than a little loss of time and paper. You will find that such an ocular demonstration will be useful for the purposes you seek; the effect of such a part which you had neglected, will strike you; such disproportions will reveal themselves, and if on inspection things come to assume different proportions, and that your project, despoiled of the illusions with which you pleased to surround it, shows in its bare proportions exactly what it is, for instance, that it is inexecutable without a radical change, you will then esteem yourself happy to have chosen an expeditious means and you will recompense with new courage on a new basis, aided by experience, as if you had held between your hands the very object of your meditations, and the fruit of a long research.

OLD ideas of how diamonds were found—one of the fifteenth century by Nicolo Conti is of especial interest. He says that at Albenigaras, 15 days' journey north of Bijipur, (Bajengalia), there is a mountain which produces diamonds. The method of obtaining them, which he describes on hearsay, is similar to that of the celebrated Arabic myth which the travels of Sindbad the sailor and of Marco Polo have made familiar to every one. The idea of diamonds being collected by throwing pieces of meat freshly cut from a slaughtered cow or buffalo into a valley inhabited by venomous serpents, which pieces with diamonds sticking to them, were picked up by birds of prey, and recovered from them by the diamond-seekers, probably took its rise from a sacrificial custom in connection with the worship with the sanguinary goddess of riches, whom Heyne ("Tracts," page 95), alludes to under the name of Ammarwaru, as the partners of the mine. The pieces of meat cut from the victim were probably thrown about over the ground, and were naturally picked up and carried off by the birds. This I believe to have been the foundation upon which the fabulous superstructure was erected.—*Nature*.

Mr. M. Grossmann, in debating the different styles of barrels, says no proofs are necessary to claim the superiority of the barrel supported on two sides of its axis, and the necessary height is most generally present. The arbor, also, is easier to be made by such an arrangement, and the ratchet, in case of injury, is replaced with more ease, and only to the thoughtless continuance of working in the same old grooves is due the fact that so many watches are still made with a moveable barrel.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Eighty-eighth Discussion.—Communicated by the Secretary.

[NOTE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. Write only on one side of the paper, state the points briefly, mail as early as possible, as it must be received here not later than the eighth day of the month in order to be discussed and reported in the CIRCULAR for the next month.

OLIVER CROMWELL'S WATCH IN BALTIMORE.

Secretary of Horological Club:

A few days ago, I was shown by one of my customers, a curiosity in the shape of a watch, which was given him by an old English gentleman who claimed that it was worn by Oliver Cromwell, whose reign extended from 1642 until his death in 1658. It is an open face, silver case, gilded; a verge movement, and was made by James Ilbery, London; its number is 8,676. The outside case is covered with shagreen. Pasted in the outside case is the advertisement of "A Hickie, Patent Lever Watchmaker, St. James St., 69, Liverpool"—evidently placed there by a man who has repaired it. If you, or any of your numerous readers can throw any light on the probable age of the watch, or can tell the date of James Ilbery's watchmaking, we would be very glad of any information on the subject. I will be glad to hear through the CIRCULAR or otherwise, concerning it.

Baltimore, Md. Yours truly, W. L. H.

The Secretary stated that he had no work giving any account of the matter, and if any reader can furnish the desired information he should be glad to have them do so.

HALL'S NEW "GEN" SCREW DRIVER.

Mr. Uhrmacher exhibited a new watchmakers' screwdriver, which is about to be placed in the market by the J. G. Hall Mfg. Co., the makers of the well known Hall staking tools, etc. It has a solid brass fluted handle, with a hard rubber head, which remains stationary against the first finger, while the handle turns freely in it, and a steel point, tempered just right and fastened firmly in the handle. The handle and point (all except the rubber head) are nicely nickel plated, making the tool an ornament to the bench and preventing tarnish or rust. The sides of the point are concave in form, which makes it hold better in the screw and less liable to slip out of the slot, and the whole tool is first class. They assure us that no pains will be spared to make them "as they should be," and their reputation is a guarantee that the tools will be, as they really are, both handsome and excellent. The cost is only twenty cents, complete, and they will doubtless meet a general welcome from the trade.

THE PHENIX HARDENING COMPOUND FOR STEEL TOOLS.

Mr. Blowpipe called the attention of the Club to the Phoenix Manufacturing Company's new compound for hardening steel. He had tried it for hardening a number of tools, and found it most excellent, giving both hardness and toughness to the metal. The method of using is very simple. The article is heated to a dull heat, plunged into the compound, then again heated to a cherry red, and cooled in cold water. Tempering is not necessary, except for cold chisels and other tools similarly exposed to blows. The compound is also said to restore burnt steel. Sample packages may be obtained from the company at 107 High Street, Newark, N. J., and he thought that those who had occasion to make or harden their own tools would do well to give it a trial.

HOW TO MANIPULATE THE MAINSPRING.

Secretary of Horological Club:

In the July number of THE CIRCULAR, "I. S." asks for the best way, in detail, of treating the mainspring, and as that part of the watch has been the subject of considerable experiment with me, trying to find out that very thing, I will give my way of treating it, as a result of those experiments.

First, let the spring down; then if there are stop works, or it is an English lever, notice carefully the exact number of turns, or parts of turns the spring is set up, as you let it wholly down; make a mental note of it, so you will not forget. Take off the lid, remove the arbor

if a loose one, then with the tweezers lift out the inner end of the spring, holding the thumb on the edge of the barrel so it will not fly out, then by holding a thumb on each side and lifting off first one and then the other, the spring will follow round and come out of itself. If the hook is attached to the spring, as to an English lever, when the spring is all out but about two-thirds of the last turn, hold it there with the thumb of the left hand, and with the tweezers or a push pin, push out the hook from the barrel, and you have the spring out, without twisting it in the least.

To clean it, I take the corner of a rag, fold it once to make it narrower, and at the same time give it more thickness, then fold the end over the spring, and with the nails of my thumb and middle finger of left hand, pressed one on each side of the spring and rag, while with the other hand I pull the spring through, a little at a time, letting go often and taking a new hold close up to the rag every time, giving short pulls with a twisting motion of the right hand in the direction of the center of the spring; draw through thus two or three times, or until the spring is perfectly clean, which with a little practice will not take ten seconds to do; but always bear in mind, and never under any circumstances straighten a spring out.

I use alcohol and pieces of well-worn cloth in cleaning all the parts of a watch, except of course the escapement, for that I use benzine, and dry it in boxwood sawdust. I use no chalk or whiting, and a brush very little, and that the softest I can find, wet with alcohol to wash off the oil and dirt, then rinse in the alcohol and dry in the cloth.

After cleaning the mainspring and barrel, I replaced the spring by using a winder if it is a thick strong one; if a light one, with my fingers, in very nearly the same manner given by Mr. McFuzee, then set it up the exact number of turns it was before, if these are stop works. If you give it less strain the watch will not go well, and if you give it more strain than it had before, the spring is very liable to break in short time. For this reason I try to give it the exact number that I found it to have.

In putting in a new spring, if there are stopworks, it is my practice to set it up all it will bear, or so there will be about half a turn short of being fully wound. As for oil, I use none at all on the spring, as I have found by experiment that better results are to be had without it.

I will give one or two of them. I have repeatedly had watches handed me which had just been cleaned, but would not go well. On examination everything would appear to be all right, except that the mainspring and barrel would be flooded with oil. For an experiment I would take out the barrel, clean it and the spring, thoroughly, and replace again, oiling only the arbor bearings. When, nine cases in ten, the watch would go off finely, and continue to do so.

For another, I had a fine Waltham movement to clean, which I did thoroughly, every part; and when I replaced the mainspring, I run it over with a slightly oiled rag. This watch had a habit of stopping occasionally, until I finally took the spring out, wiped it with a clean dry cloth two or three times, cleaned out the barrel, and replaced, oiling only the arbor bearing, and the watch never stopped after that.

These are only a few out of some dozens of similar cases, which have convinced me, if they do not others, that the mainspring is better without oil. But I have already made this very much longer than I intended when I commenced, and will draw to a close.

Yours truly,

'52.

Mr. McFuzee said that the letter from Mr. "S." was instructive and suggestive. Discussion is always beneficial, for we can get many new ideas, even if we do not agree in our opinions on details. He understood this gentleman to be in favor of not oiling the spring at all, but only the arbor bearings. With this he could not agree, for he believed in applying oil of proper kind and quantity to all rubbing surfaces, except a very few where the evil resulting from its use would overbalance the benefits—as in the case of oiling the notch in the lever fork, where the dirt would gradually be caught by the lubricated surfaces would be more objectionable than the dry friction of the parts without oil.

But he did not think that the action of the mainspring was of such delicacy as to be affected by such slight matters. On the contrary, the mainspring is the source of power, and is better able than any other part of the movement to overcome resistances. He could hardly believe that a spring of the proper strength to drive a watch would be rendered incapable of doing it, merely by a slight greasiness given to it by "rubbing it over with a slightly oiled rag," as the gentleman mentions in the case of the Waltham movement that he

cleaned. If that was really the cause of stoppage, then the margin of strength must have been very small. How much more effective power would the spring have when perfectly dry and clean, than when slightly greasy? Would we not rather expect that the slightly greasy coils would slip over each other more readily than if perfectly dry? How can "52" account for a loss of power in such a case? Is he quite sure that the greasiness of the spring caused the stoppage?

Nor could he agree with "52" as to the advisability of keying the mainspring up exactly the same as it was before. If one could be sure that only good workmen had handled the watch before, and that the former amount of keying up was the very best for that watch, then it would be proper to follow suit. But when it may very possibly have come from the hands of some tinker who knows no more about the proper degree of keying up mainsprings than a hog does about religion, then "52" would hardly consider it his duty to key up precisely as his predecessor had done, would he? We cannot depend on it being right as it comes to us, and the only really safe way is to know how much it ought to be keyed up, and key it up so. This point is a very important one in setting up English levers—more so than with other kinds of movements.

Many years ago, when English watches were the rule and not the exception, he had made a great local reputation as a watch repairer, by his success in making English watches do good service. For thirty to fifty miles around watches that nobody else could make keep time, or even go, would be sent to him to be overhauled. So great was the confidence of his customers in his skill that, when they were recommending their friends to try him, they would say, "If he does not make it go I will pay you back whatever he charges you." Now there were undoubtedly many other workmen equally skillful in that large section. Why did he succeed, while they failed? Simply because, after he had put a watch in thorough repair, he took care to give it power enough to drive it properly. He keyed up the spring till the watch played freely and vigorously, and with power to spare. And if the old spring would not admit of that, he rejected it and put in one that would give the watch some "life." But the others followed the "rule," to key up one-quarter turn.

Admitting that the springs would be more liable to break when so keyed up, was it better to take that risk, and have the watches go—or to favor the springs, and let their customers carry dummy "timepieces"? For his own part, he always thought the former the better policy. "52" is undoubtedly correct in what he says about the risk, but he must hold the requirements of the whole watch above those of a part of it. All these things are matters of opinion, upon which workmen differ, and we are always pleased to receive and discuss the views of those who differ with us, leaving our readers to form their own conclusions after hearing all sides. We hope to receive further communications from Mr. "52," with accounts of his ways of doing work, fitting up tools, etc.—also from others who have new ideas to advance.

ARTISTIC WATCH CASE.

Secretary of Horological Club:

I have in my possession a part of an old watch case. It is the back of an old double case or "bull's-eye," and is supposed to have been lost by some of the French forces under Jumonville, as it was found on his route from Fort Duquesne to the place where he was attacked by Washington on the 28th of May, 1754. Jumonville was killed, and the greater part of his force was either killed or taken prisoners. It was found on the 2d of last July, some two feet under ground, by a man digging post-holes. It is of fine gold, about 15 dwts., repoussé work—represents the Judgment of Paris awarding the golden apple to Venus. There is represented, Mercury with his wand, Paris as a shepherd with his staff and crook, dog, and bundle of arrows, Venus accompanied by her son Cupid, receiving the golden apple, Minerva reclining, her helmet near her, and one foot resting on her shield, on which is the head of Medusa, the Gorgon. Juno is accompanied by her peacocks; one in flight is partly defaced, the other is standing near her.

It is certainly a fine piece of work, and in a good state of preser-

vation. It was made by a G. M. Moser, whose name is on it. I find his name in Appleton's Cyclopaedia, and he is represented as a man of some note.

If the Horological Club could give any further information it would be gladly received, and oblige, Yours, etc., W. H.

[We publish the letter, and if any of our readers know anything about such a watch, we hope they will inform us.—Secretary of Horological Club.]

FINISHING SILVER JEWELRY—REMOVING SOFT SOLDER FROM FILAGREE WORK.

Secretary of Horological Club:

Let me know through the CIRCULAR how I can give silver jewelry the smooth satin finish found on English goods, and also how I can best remove soft solder from silver filagree in order to frost it, and very greatly oblige, Yours very truly, J. S. B.

Mr. Kolliver said that the satin finish is imparted to silver by whipping the article with a scratch brush made of steel and brass wire. It is very difficult to take soft solder from filagree work, as it runs between the wires where you cannot get at it. I know of no way to do it effectually.

DOES CHANGE OF OWNERSHIP VOID WARRANTEE ON A WATCH?

Secretary of Horological Club:

Will you please inform me through THE CIRCULAR whether it is customary, when a watch is put in good order, and warranted for a year, that if it should change hands before the year is out, does the guarantee end then or not? I ask because there is a difference of opinion here. Respectfully, W. H. W.

Mr. Clerkenwell said that, by right, the warrant would end when the watch changed owners, because it might fall into the hands of a person so careless or incompetent that the workman would not have warranted the watch at all, had he owned it when the repairs were made. If it was a special warrantee, that is, made on account of a particular person being the owner and carrying it, then it would end when he ceased to own the watch. But it is customary, on ordinary warranties of work, to warrant for a year "with proper usage"—regardless of ownership. Mere change of ownership would not affect the receiving, and would therefore not be a good reason for voiding such a warrantee, so long as the new owner knew how to care properly for the watch, and did so.

JACOT'S REGULATING PENDULUM BALLS.

Secretary of Horological Club:

I send you two of my patent pendulums, with the request to present them to the honorable members of the Club for inspection at their next meeting.

Having had in charge for several years the clock department of a large jewelry establishment, I soon became aware of the defects of the nut-screw for regulating clocks, as it was entirely guess work, and subject to accidental turning each time the clock was moved, thus rendering a new regulation necessary. I am confident that I have produced a pendulum which has removed these existing defects in all other styles now in use. I have divided the scale so that each long division corresponds to one minute per day. The indicator being fastened on the same arbor on which the cam is soldered, any motion of one is sure to bring a corresponding one from the other without any loose motion. H. C. J.

Mr. Uhrmacher exhibited the articles, one of which was a plain ball, the other an extremely tasty and ornamental pendant, having a graduated card with index pointer, the front of the pendant being nickel plated, and very neatly gotten up. The former was graduated for fifteen minutes change to slow or fast, and the latter for twenty-five minutes. The change is made by revolving a cam fixed on the index arbor, on the edge of which the weight of the ball rests. As this cam cannot shift accidentally, there is no danger of disturbing the regulation, and Mr. Jacot seems to have solved the problem very successfully. They would certainly be an ornament to any clock, and the cost of the plain ball was probably cheap enough to permit its use on even cheap common clocks. He thought clockmakers and repairers would find it worth their while to give them a trial.

The Nation in Mourning.

DURING the past two weeks the American nation has been in mourning for the death of President James A. Garfield, who died at Elberon, N. J., on the night of the 19th ult. Although his demise had been anticipated, yet the country hoped, almost against hope, that this nation would spare the pain of placing the name of James A. Garfield beside that of Abraham Lincoln, as the second President whose death was caused by the bullet of an assassin. All that medical science could do to preserve his life was done, but after eighty days of suffering and pain, endured with a majesty of fortitude and courage that has never been equaled, the President finally yielded to the inevitable and calmly passed to the life beyond. Since the day the assassin aimed at his life, the nation, and, in fact, the whole world, has sat by his bedside, listening to his heart-throbs, and watching every change of symptom with intense anxiety, mingling their prayers, one with another, that his life might be spared. But a Divine Providence ordained otherwise, and for reasons not comprehended by the finite mind, summoned our beloved President to communion with the Infinite. The nation is, therefore, in mourning. Never before in the history of this country have the trappings of woe been so conspicuously displayed, or the evidences of universal sorrow been so spontaneously assumed. Every house in the land has been draped in the emblems of woe, flags have been fixed at half mast, and on the day of the funeral, business was everywhere suspended, and the people assembled in their churches and public places to listen to funeral orations. The life of President Garfield, his successful rise from a lowly station through all the grades of promotion in civil life and on the field of battle—bearing himself with dignity, ability and unswerving integrity at all times—had endeared him to the people, and they loved him because he shone forth brightly as a choice product of republican institutions. We were proud of him as a self-made man, and proud, also, that he illustrated so nobly the possibilities open to every young man in the land. But when he was laid upon his bed of suffering and pain, and the public was admitted to view the charms of his private life, to witness the simple, confiding love of that great soul for his brave wife and children, and to view the calmness and resignation with which he faced death and said "God's will be done," the hearts of the people went out to him with a degree of tenderness and sympathy that has never been extended to any other man, and the memory of James A. Garfield will be cherished forever with that of Washington and Lincoln.

The significance of this widespread mourning for the dead President is of a humane, and not, as some people fancy, of either a political or an international character. It is the man, and not the President, toward whom all this feeling goes out. It marks the progress of the human race in civilization more emphatically than any increase in wealth or advance in material comfort.

But the obsequies are over, and Chester A. Arthur, late Vice President, has been duly installed as President of the United States. The administration at this writing, remains unchanged. There is nothing to indicate that any radical changes will ensue. During these three months since President Garfield was shot, there has been no political, commercial, or financial disturbance, nor is any threatened. Prosperity beckons us on every hand, peace and good will reign on all sides. But for our great sorrow our prospects could not be brighter. Such a calamity as has fallen upon us would have bred a revolution in other lands, but with us has but given additional proof of the stability and trustworthiness of our republican form of government. The lesson is a serious one for the whole world to ponder.

Patents.

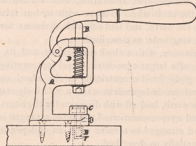
BUTTON.—Wellington P. Dolloff, Providence, R. I., has been granted letters patent for the following button:



Claim.—1. In a button, the spring, *C*, provided with the notches, *c c*, and the tongue, *c'*, in combination with the shoe-cap, *F*, and bridge, *E*, for holding the post, substantially as described.

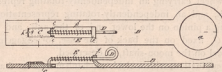
2. In a button, the combination of the spring, *C*, with the thin flexible plate, *D*, made to completely cover the surface of the spring and to intervene between the spring and the end of the post, substantially as described.

DEVICE FOR SETTING STONES IN JEWELRY.—John Hagerty, Providence, R. I., assignor to Daniel S. Cooke, same place.



Claim.—The yielding die, *C*, with its barrel, *E*, and spring, *F*, in combination with a hollow plunger, *B*, and spring, *D*, operating in a suitable frame by means of a hand-lever or other suitable device, for the purposes specified.

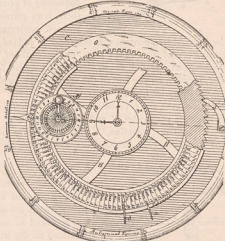
Arthur W. Bush, Boulder, Colorado, patent granted for watchmaker's tool, specification as follows:



Claim.—1. As an improved article of manufacture, a watchmaker's tool constructed substantially as herein shown and described, consisting of plate, *B*, having slot, *b*, and lug, *f*, and spring-actuated slide, *C*, provided with handle, *D*, operating as set forth.

2. The combination, with the flat rectangular plate, *B*, provided with rabbeted slot, *b*, recess, *h*, and lug, *f*, of the slide, *C*, provided with edge grooves, *d*, and recess, *g*, handle, *D*, and spiral spring, *E*, substantially as and for the purpose described.

ASTRONOMICAL CLOCK.—John L. Blair, Clear Spring, Md.



Claim.—1. An astronomical clock consisting of a clock-case and

running mechanism having the hand-shafts elongated, as described, in combination with a dial arranged near the ends of the elongated shafts, and a mechanism representing the revolution of the earth and moon, arranged behind and around the clock-dial and in front of the running mechanism, substantially as described.

2. The combination, with a clock mechanism and its dial representing the sun, of a larger concentric wheel representing the earth's orbit, and a disk or globe mounted eccentrically upon the wheel and geared for an independent revolution, substantially as described.

3. The combination, with a clock mechanism and its dial representing the sun, of a larger concentric wheel representing the earth's orbit, a disk or globe mounted eccentrically upon the wheel and geared for an independent revolution, and a fixed annular dial arranged upon the orbit-wheel to move with it, but relatively fixed with relation to the earth, and laid off with divisions for indicating the time at any longitude, as described.

4. The combination, with a clock mechanism and its dial representing the sun, of a larger concentric wheel representing the earth's orbit, a disk or globe fixed eccentrically to the wheel and arranged to revolve about an independent axis, a relatively stationary dial surrounding the earth, laid off with divisions for the hours and phases of the moon, and a representation of the moon arranged eccentrically to the earth, and arranged to revolve upon an independent concentric axis, substantially as described.

5. The combination, with a clock mechanism and its dial, of an eccentric-wheel carrying an independently-rotating representation of the earth, and a gearing, substantially as described, connecting the axis of the earth with the central axis of the clock by wheels geared for one revolution in twenty-four hours, as described.

6. The combination, with a clock mechanism and its dial, of a concentric wheel carrying an independently-rotating representation of the earth, and an independently-rotating representation of the moon, having a pinion on the lower end of the axis, and a set of gear-teeth, *O*, fixed on the back of the case, for engagement with the gear-wheel on the moon-shaft, as described.

7. The combination, with a clock mechanism and its dial, of the wheels, *d* and *f*, having a pin, *e*, the lever, *L*, having pawl, *d*, and the concentric wheel, *H*, having ratchet-teeth on its periphery, substantially as and for the purpose described.

IMPLEMENT FOR REMOVING BROKEN SCREWS FROM WATCH-MOVEMENTS.—Wm. H. Blaisdell, Boston, Mass., assignor to himself and Mark A. Blaisdell, same place.

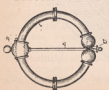


Claim.—1. The herein-described implement for removing broken screws, consisting of pliers having their jaws provided with pointed projections, *d e*,

adapted to be brought into contact with the opposite ends of a broken screw for the purpose of turning the same, one or both of the projections having its end serrated, roughened, or otherwise formed to prevent it from slipping on the end of the screw as the implement is turned, substantially as set forth.

2. The combination of the pivoted levers, *A B*, with their jaws, *b c*, the former having a projection, *d*, and the latter being curved and provided with a pointed projection, *e*, placed opposite to and in line with the projection, *d*, substantially as and for the purpose described.

BROOCH.—Carl A. Türpisch, New York, N. Y.



Claim.—1. A brooch made substantially as herein shown and described, and consisting of a wire bent so that the ends are in contact, combined with a cap attached to one of the ends and a pin articulated on the wire, as set forth.

2. The combination, in a brooch having

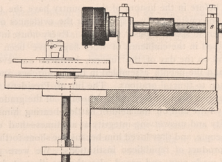
the wire, *A*, bent so that the ends are in contact, of the cap, *C*, attached to one of these ends, the sleeve, *D*, loosely mounted on the wire, and the pin, *E*, attached to the sleeve, *D*, substantially as herein shown and described, and for the purpose set forth.

BRACELET.—Wm. H. Ball, Newark, N. J. Filed June 28, 1881.

Claim.—In a segmental bracelet having sliding blade, *B*, the spring-pressed catch, *A*, having upper inclined plate, *a*, and lower flat plate, *a'*, the two inner front edges of said plates extending outwardly to an unbroken straight edge, in combination with a sliding blade, *B*, rigidly clamped within the spring-pressed catch, *A*, adapted to guide the catch within the engaging mouth, *C*, substantially as described.

MACHINE FOR POLISHING CLOCK-PINIONS.—Everett Horton, New Haven, Conn. Filed July 1, 1881.

Brief.—The spiral ribs of the polishing-wheel act on the pinion like a worm, causing it to revolve, and the wheel being coated with polishing material the pinion is polished at the same time. When the rib fits between the teeth two sides are polished at once. When the rib is smaller one side is polished by the first part of the rib, and then the second part of the rib reverses the motion of the pinion and polishes the other side.



Claim.—1. The polishing-wheel constructed with a spiral-ribbed surface corresponding to the teeth of the pinion to be polished, one portion of the spiral rib the reverse of another portion—that is to say, one right hand and the other left hand—combined with mechanism, substantially such as described, to hold the pinion and permit it to be presented to the spiral rib of the polishing-wheel, substantially as described.

2. The polishing-wheel constructed with a spiral rib corresponding to the teeth of the pinion to be polished, combined with a carriage constructed to support the pinion and arranged to move in a path parallel with the axis of the polishing-wheel, to present the pinion with its axis at right angles to the axis of the polishing-wheel, substantially as described.

3. The polishing-wheel constructed with a spiral rib corresponding to the teeth of the pinion to be polished, combined with a carriage constructed to support the pinion with its axis at right angles to the axis of the polishing-wheel, and made movable upon a plate arranged to rotate in a plane parallel with the axis of the polishing-wheel, substantially as and for the purpose described.

WATCHMAKER'S TOOL.—Anthony G. Linnbaum, Baltimore, Md. Filed July 7, 1881.



Claim.—1. The case-spring pinchers having one of the jaws a projection, *e*, provided with the notch, *f*, and in the other jaw a concave bearing, *d*, the notch being opposite to the bearing, as set forth.

2. The case-spring pinchers having a short jaw provided with a notched projection, *e*, and a long jaw formed with a concave bearing, *d*, substantially as specified.

3. The case-spring pinchers having a detachable jaw formed with a projection, *e*, notched in the direction of its length, substantially as specified.

Guide for Watchmakers's Apprentices.

BY HERMANN SIEVERT.

[Continued from page 158.]

The Correction of the Escapement.—Upon close examination of the sketch you will easily recognize that if the motion centers *A* and *B*, or those of wheel and anchor, were moved closer together, the entrance pallet would much sooner approach the tooth than the opposite one, because the operation of removing takes place nearly vertical to that of the first. But since the entrance pallet determines the amount of drop at the exit pallet, and the reverse, by placing deeper the escapement, the outer drop will decrease sooner than the inner one. If, therefore, by such an escapement the inner drop is nearly correct, but the outer are rather large, simply place the anchor deeper, and the drop will be even on both arms. If the inner drop is larger than the outer, the anchor is too wide for the wheel. It is to no purpose to grind down the exit arm, the only correction at command is to draw the temper and set it closer. Considerable experience is demanded to do this; as the inclination of the pallets is changed at the same time, which must be restored. The anchor must be well hardened again at the pallets, which thereupon are ground and finely polished. Special contrivances for fastening or locking are necessary to bend the pallets entirely straight; all serve the same purpose, however, that the composition file used for grinding and polishing can take no other direction than the desired one. A make-shift may be used, by lacking the anchor into a sink or hole of a straight brass plate, in such a manner that the pallets only protrude a trifle above the surface. It is easier to inclose the anchor between two brass plates, which can be fastened together by two screws.

Again, an anchor is too narrow, if the outer drop is correct, but the entrance pallet does not permit the tooth to pass. Slightly grinding down the offending place is the quickest remedy, but great caution is required not to remove too much, as the anchor might become too wide. Use a fine oil stone for the purpose.

Never neglect to correct an escapement with an extra amount of drop on one or both sides. A shallow escapement hastens the rate of the clock and makes it irregular, because the strong subsequent recoil acts unfavorably upon the free motion of the pendulum. You will see ruts worn in many pallets, which owe their origin to such a defect, to which the softness of the metal must be added.

There are various other defects which produce a bad rate. First on the lift come oblique pallets, which do not lie parallel to the anchor arbor, or an oblique pallet side where the drop takes place. The anchor motion would increase or decrease corresponding with its arbor when it pushes, enabled by its shake, toward one side or the other. Such errors can easiest be corrected by grinding. Holes worn in should also be ground out; the removal of a pallet toward one side sometimes remedies the fault.

Also the scapewheel can be afflicted with shortcomings, which act injuriously upon the rate. Since it progresses by jerks, and its inertia and its motion must alternately be overcome, it should be as light as is consistent with durability. Too weighty a wheel produces a loss of power, beside a wear of pallets, as they drop upon it with greater propelling force.

A scapewheel which is not round produces serious disturbances in an escapement. It must be carefully ground down, and the tooth points corrected with a file. You will easily see that the anchor, in such an operation, will become too large, if it was proportioned before.

Not to expose the escapement to any shaking motions, it is necessary to have the arbor pivots rest in faultlessly polished holes. A cramping should least of all occur here.

The Fork.—The piece fastened upon the arbor is called the fork, and its duty is to connect the wheelwork and anchor with the pendulum. It must be light, so as to exert no disturbing influence upon

the motion and durability of the hind pivot and its hole. The pendulum must fit exactly without cramping, in it; a part of the anchor's motion would be lost uselessly for the pendulum, if it moved too loosely within the fork. When such a defect comes to your notice, beat the fork a little closer together, or if it cannot be done otherwise, file out a little from the proper place, to close the inner surfaces. It need hardly be mentioned that the operating faces should be smooth and truly parallel. The least cramping of the pendulum rod in it will cause the clock to stand still. Another primary condition is that no manner of independent motion shall be possible between anchor and fork, but must sit immovably upon the arbor. If the clock goes lame, and the defect cannot be found, seek it at once in this.

The pendulum suspension is of great importance; the better it is the less power need be communicated to it by the wheelwork; we will bestow some attention to this part.

A peculiar kind of pendulum suspension is to be seen in the Black Forest clocks, and since this part is one of the most important, and should receive full attention, we will explain it. This kind consists simply of a hook of very thin iron wire, into which is suspended a large, circular eyelet. The size and form of the eyelet is important, because if small or oval it would move upon the hook very much with the movement and friction of a pivot, one of good dimension will make a rocking motion, as long as it is not worn in.

A second, easily made suspension is that of a thread. It must not rub by its motion, and must consist of silk not too strong. This suspension, as well as the one mentioned, must not be made too long, because the trembling taking place during the escape of a tooth, is apt to cause loss of power.

The best suspension is had by means of a spring. It occasions the least friction, and is exposed to no change by time. But if it is intended to render good service, the pendulum motion must only use the spring's elasticity. No independent motion can be permitted to occur at the place of fastening nor at the point of suspension. Always bear this in mind. The spring must not be too thick, and should be in all respects, of faultless condition. Especially unsuitable is a twisted one, which by the to and fro motion makes a crackling noise. A single sideward twist of the bob is enough to utterly ruin the suspension. Wherefore be very careful by hooking and unhooking the pendulum, and never perform the slightest work upon it while hanging. A clock with ruined pendulum suspension either goes with a dead motion, or refuses to go altogether.

To insure the same direction of movement and to prevent any possible friction of rod and fork, the suspension must be in the same direction with the anchor arbor. Moreover, any independent motion produced by that of the pendulum, such as a shaking of the bob upon the rod, of the clockwork within the case, or the entire clock itself, is connected with a loss of power, which may produce the standing still of the clock. Have great care to fasten the parts mentioned, and place or suspend the clock firmly.

The calculation of a clock upon the basis of the number of teeth or wheels and pinions, is best done by beginning at the center wheel. As you know, we find the number of wheel's revolutions by dividing the number of its pinion leaves in that of its teeth. We need not repeat this method at every depth by complicated clockwork, but need simply multiply the number of teeth of all driving wheels, and divide this sum by the number of pinion leaves, found in like manner, whereby we obtain the number of revolutions of the scapewheel. This, again, occasions double the amount of oscillations at each revolution, as it has teeth. Hence we may deduct, that the number of oscillations is equal to double the sum of wheel teeth, divided by the sum of all pinion leaves. Extending this calculation upon the entire clockwork, we receive the number of oscillations for one revolution of the drum or barrel wheel; if, however, we commence at the center wheel, we obtain the number of oscillations for one hour. Let us suppose, in a clock: The center wheel has 80 teeth, the third pinion,

8 leaves; third wheel, 76; scape pinion, 8; scapewheel 40, and we have

$$\frac{80 \times 76 \times 40 \times 2}{8 \times 8} = 7,600$$

as the number of oscillations per hour.

It is unnecessary to farther elucidate by an example, you will be able to find in like manner the number of revolutions of the center wheel during one of the barrel or drum wheel, and you may also ascertain from this how many revolutions the latter must make for the motion period of the clock. If a weight clock is under investigation, find the height of fall, that is, the entire distance through which the weight falls during the motion period, as follows: Supposing the drum wheel makes 12 revolutions, and the diameter of the drum is 4 cm. The diameter of a circle is proportioned to its circumference nearly as 100 : 314, we thus have

$$\frac{314 \times 4 \times 12}{100} = 150.72 \text{ cm.}$$

or nearly 1 meter, 51 centimeters as the length of the cord, which unravels within the stated period.

In a reverse manner, by the height of fall being given, you will be able to calculate the diameter to be given to the drum.

SPECIAL JOBS.

Inserting Pivots—Should a pivot be broken, or worn away so much as to be useless upon re-turning, a new one may be inserted in its place. Drill the hole in the lathe, of a depth three or four times its diameter, and insert the new pivot, which you have filed truly round, not tapering, having previously given it the requisite temper. After you have filed the end carefully that the pinion, or arbor, runs true, finish the pivot in the lathe.

Should the pinion be so hard as to resist endeavor with a well-hardened drill, you are compelled to draw its temper, and after having finished the insertion, be careful to restore it again. To do this, dismount the wheel, previously marking the exact spot where and how it was placed. Do not neglect before annealing, and afterward, before rehardening the pinion, to coat it with soap, in order to preserve the surface intact and clean, to facilitate polishing. Should the pinion arbor have become warped during the process of tempering, straighten it with judicious taps with the round face of the hammer, using an underlay of some soft metal, such as lead, copper, or brass. Another way of straightening a warped arbor is to strike it upon the hollow side with the round hammer face; in this case the underlay must be hard and flat.

Making a Pinion—Since a pinion-cutting tool is seldom found in a repair shop, and as even a very skilful workman will be able to turn out a barely satisfactory pinion, it is best under all circumstances that the watchmaker purchase the ready made and polished article. Nevertheless, it may happen at times that a suitable one is either not on hand or cannot be had, and it is well enough that the apprentice should understand the manipulation of making one.

A suitable piece of drawn pinion steel is cut off to proper length, and the leaves are, where the pinion is intended to stop, creased down to the bottom. The superfluous leaves may then be broken off, to form the arbor. The pivot ends are next located with care, to have the arbor run true; if necessary, also straighten the arbor. When the work has been advanced far enough, turn off the arbor above and below, until clean, and make the pinion ends flat. To proceed with more security, turn from each pinion end, that is, so much as it has in excess in length, the rounding down to the extended pitch diameter. This will enable you to see where the rounding has to commence, and you can measure the distance between two leaves with greater facility. Next commence the working and flanking of the pinion by means of suitable files, a work which demands the uttermost skill in the manipulation of the files. The bottom is removed down to the arbor clearly and straight, the flanks also are produced thus that the leaves receive this necessary due regularity. It is

advisable to repeatedly measure across the turned pitch diameter at either pinion end with a pinion measure, spanning two and two leaves, to ascertain where a further correction is requisite. The file must be manipulated thus that the necessary cycloid form is obtained, do not make the leaves round. When the leaves are of requisite regularity and size, equal to one-half of their interval, you may give the finishing touches with a rounding file. Should the entire diameter of the pinion be too large, turn off sufficiently, you may easily judge how much is necessary by the turned on pitch circles. When finished, the rounding should be faultless.

To remove the file marks, grind the pinion, while yet soft, with a fittingly formed iron grinding file and oil—stone powder and oil. Next turn one end flat, on the other turn a shoulder for the wheel, in case this is intended to be immediately mounted with it. If the wheel is to be fastened apart from it on the arbor, flatten both pinion ends.

To prevent the very disagreeable warping, while being hardened, of long and thin objects, such as arbors, they must not be plunged in water horizontally, but vertically. The tempering is best done in oil, because if done dry, the outer parts, and especially the extremities, are apt to become too soft, which does not take place when heated in oil. As soon as this burns, remove it from the flame, and permit it to burn out: the pinion will be found to possess an equable, suitable temper. Able workmen, who understand how to work harder material, will extinguish the flame ere yet the oil is entirely consumed; the pinion must, of course, be removed from the tempering plate, to prevent an after influence of its heat.

If, in spite of all care, the pinion should have warped, the arbor has to be carefully straightened. An especial contrivance is used for the subsequent grinding and polishing, which I will describe at some future time; at present I will confine myself to detailing the older and more simple methods. In case of necessity, the grinding file, to be followed with wood, renders passable service for polishing. Use powdered oilstone or very fine emery for grinding—and at first coarse, after that, fine red, for polishing.

Before the end faces of the pinion are ground and polished, reduce the arbor to its true size. If the wheel is intended to be riveted upon a brass collet, provide the arbor with several faces, and drive the collet upon it, taking care not to injure the pinion. If the pinion arbor is too thin and long, as not to permit the taps, it would be better to solder the collet upon it.

Making a Wheel—Although the work of making a wheel offers comparatively less difficulties than that of a pinion, since its most important part, the tooth rim, is performed by machinery, you are nevertheless called upon as good workmen, to bestow your utmost ability on the execution of its shape and form. A wheel of the miserable appearance, such as frequently comes under the repairer's observation, is everything but nice, and does not by any means praise its maker. Only make use of well-hammered and prepared brass, of exquisite compactness. To make the wheel, choose a piece of such brass, of rather larger dimensions, than the wheel intended, and drill a small hole through the center. Next fasten it into a step chuck, turn one side flat, also enlarge the hole a trifle, to make it truly round, and finish by turning the flank to its exact size. Now fasten another convenient piece into the chuck and turn it smooth. Warm it, while *in situ*, and coat it with sealing wax. Next press the equally warmed blank with its priorly flattened face against it, lightly pushing it from side to side, until you feel that the two metallic faces rub against each other. The wax being warm, you will be able to locate the wheel blank in a fitting position, by inserting a small piece of wood into the hole, while rotating the chuck. Thereupon turn the other side flat, and it you have done your work well, the blank will be perfectly smooth and of uniform thickness. A like result may be obtained without the step chuck, but with greater consumption of time and labor. Both sides must be reduced by being filed, in this manner, and the circumference rounded upon the center arbor.

Next follows the toothing upon the rounder and cutter. Many of

these tools, to be found in our repair shops, simply cut the tooth spaces, without at the same time establishing the epicycloid rounding, which then must be done by hand with the rounding file. Even if a skillful workman is able to produce a passably good wheel in such a manner, with much labor, a rounder only may be relied on for an exact, regular and smooth toothing, which at the same time completes the tooth rounding. The graver cutter is best adapted for the establishing of the well-known exact tooth form (Fig. 1). Either within or upon a strong arbor, which by a balance wheel is to be rotated in quick revolutions, is inserted a single short graver ground in conformity with the desired tooth form. To preserve the neces-



FIG. 1

FIG. 1

To prevent the graver from cutting round, we fasten its arbor in the so-called slide, which moves vertical to the wheel's plane. Of course, everything depends from a true and steady motion; the least want of care in this regard would prevent the toothing from becoming exact and smooth.

Although the preceding work, in its most delicate execution, demands a well-contrived and costly machine, yet the subsequent finishing of the wheel may be expedited with the least means in a satisfactory manner. To at once make the wheel light and the clock movement as airy as possible, it requires to be shanked. It then consists of three parts; the eye, the shanks, and the tooth rim. The eye is that center part immediately surrounding the hole. Designate the first eye and tooth rim by lightly turned-in rings, then draw with exact division the lines for the shanks. Through each shank opening bore a hole, insert a piercing saw, and cut out the piece as closely as convenient, following on or near the line, finishing with file, and lastly with grinding and polishing. Although a mathematical exactness in performing this work is unnecessary and contributes nothing to the rate, yet a slovenly shanked wheel is an eyesore and loudly advertises the workman as a botch. The greater the speed of a wheel in the movement, and the smaller the power imparted to it, the less hampered it should be with superfluous metal to impede its motion.

When making an escape wheel, extra care is necessary to protect its tooth points, while shanking it. A very good protection for the purpose is to turn a sink into a piece of brass, sufficiently large to admit the wheel rim; lay the wheel into it. You may then proceed with the shanking without danger.

The pinion shoulder intended for the reception of the wheel must be turned true and sharp. Fit the wheel upon it thus that it will enter without much labor or, at best, by dint of a few gentle hammer strokes upon a hollow punch—and sit tight without rivets. Should the wheel hole be too large, or the reverse, should the pinion shoulder be too large, requiring the wheel to be forced upon it, the probability is that it would not run true. The riveted wheel must sit upon its arbor in perfect equipoise; if it does not, the defect is caused by careless working, and must be remedied.

Next turn on both sides of the wheel, close to the pinion, if mounted directly upon it, a small half round groove, to designate the limit of the polished surface; then grind it with water stone, and polish with a piece of close-grained wood, or tin file, and some red and oil. Soft wood or buff-stick produce no flat polish; either agent is apt to wear down the corners. If you are desirous of imparting the highest lustre to your polish, use a clean leather stick, free of dust.

For making a new winding square only a few directions are neces-

sary. The workmen generally prefers to make it of two pieces, to facilitate and expedite the work; the thicker part, the drum, or core, is of brass, and driven upon the steel arbor. At first approximately turn the arbor out of round steel, and provide it with the necessary shoulder; you may also rough-fashion the square. Next harden the former, in the same manner as given for the pinion, also temper it thus likewise, and file the thickest part, intended for the reception of the brass piece, somewhat conical, giving it several faces. When the brass piece has been mounted and fastened in its proper place, finish the arbor upon the lathe. Be attentive in your measurements, turn and finish the shoulder with exactness, to enable you to impart the last touches with the square polishing file. If the winding square requires additional filing, enclose the remaining part, especially the round pivot end, in a brass plate, so as to receive the entire pivot, to preserve it from being injured by the file. Have it of a height not to protrude beyond the dial, it might impede the free motion of the hour hand. Round off the outer end, polish it, and break the sharp corners.

Making an anchor.—The careful repairer will often find occasion to make a new anchor, either because the old one is worn away so much as to be practically useless, or else defective. But to do this without plan or draught, is simply exposing one's self to endless hazards, and with all endeavors, it is almost impossible to make a new one void of defects. If the old one is unfit to serve as pattern, draw one according to instructions given upon a dead ground glass plate, and transfer the form of the anchor with exactness upon the well ground face of a piece of steel, of which it is intended to be made. Of course, it must have been prepared for the purpose, and possess the requisite uniformity of thickness.

For the sketch upon the brass plate, of course, you will need the closely measured circumference of the wheel. (Fig. 2). After the instructions given, you will ascertain the angle from the number of wheel teeth, which angle you will transfer, from the center *A*, by the lines *an*. Execute the draught of the anchor in the known method.

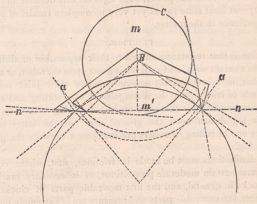


FIG. 2.

The dotted line mn , drawn through the outermost corners of the anchor, and the line $m'm$, vertically drawn upon it through B , serve for the purpose of a correct transfer to the steel. This already indicates the requisite size of the steel. You may from m' ascertain the distance to the center of the anchor B , and mark it with a tracing point. Next measure from m' the confining lines of the pallets, where the drop of the wheel occurs. Circle C serves for the exact transfer of the pallets which are in the elongation of the wheel's tangents. The other form of the anchor is, as stated, optional, and in tenor with its necessary solidity.

When at the practical execution, leave the entrance pallet rather long, not to be exposed to the danger of making the anchor too wide. If it should prove afterward to be a trifle narrow, the superfluous metal is easily removed by grinding. If possible, harden only the pallets, not to expose the anchor to the danger of warping; they must be made very hard. Others prefer to harden the entire arbor, and

then plunge it back foremost into water, because, it is said, it warps less. Of course the new anchor fits no other than the drafted center distance.

I will conclude with a remark on a very useful form which the entrance pallet should have. This pallet is straight in most French mantelpiece clocks, which is objectionable for the following reason: Enabled by a trifling excess of power, which always must be present in a clock, the pendulum will continue its swing for a short distance beyond the drop of the tooth. Of course, the scapewheel will be pressed back by the pallets, by this motion, called arc of completion. This condition is called the recoil of the wheel. This recoil must necessarily be greater at the straight entrance pallet than at the exit pallet, supposing, that the lifting, that is, the inclination of the pallets is equal at both arms. Desirable as is this equality, an unequal recoil exerts a great disturbance upon the rate of a clock. To remedy this fault, without at the same time relinquishing the above advantage of equal inclination of the pallets, the entrance pallet receives, from the place where the tooth drops, or, in other words, where the recoil commences, such as is sketched in Fig. 2, sufficiently to about equalize the recoil on both arms.

(To be continued.)

Friction—Adhesion—Elasticity—Considered in their bearings upon Horology.

A THOROUGH knowledge of the effects produced by the contact of metals is of the highest importance to the watchmaker, because it is from the intelligent application of knowledge of principles to matter that the success of this application depends in a great measure. This knowledge is also of value to him to discover the hidden faults of timepieces which he is called upon to repair, and which enables him to correct them. We will therefore attempt to enter into an elucidation commensurate with the nature of the task, and, as far as lies in our power, shed light on this delicate branch of horology—at least state the as yet very incomplete results of science and experience in the matter.

FRICITION.

Friction is that resistance offered to their separation or sliding by bodies in contact with, and progressing one upon the other, or against each other, in a direction not perpendicular to their joint surfaces. Two kinds of friction may be distinguished, viz., sliding and rolling.

Friction by sliding is that produced by a bearing within its journal, of a log drawn upon the ground, etc.; in the latter case it becomes one of rolling, if rollers are interposed between the ground and the log.

Two distinctions must be made in frictions, first, where velocity and pressure attain moderate proportions, as in ordinary machines, large clocks in general, and the first moveable parts of clocks; second, where the moveable parts and pressure are of extremely reduced proportions, such as in the last wheels of clocks and watches in general. The laws of friction are very different in these two cases.

Experience has recognized (Coulomb and M. Moiré) that, first, the friction of sliding is independent of the velocity of the motion; in other words, that if a certain force is necessary to overcome the resistance which is opposed by friction to the continuation of the two bodies, this force will still be the same, whether the velocity is augmented or diminished.

The friction by sliding is independent of the extent of surfaces in contact; thus, the length and thickness of pivots have no influence whatever upon the force lost by friction. But as wear increases with pressure, and as pressure increases in a measure as the extent of the surfaces in contact diminishes, it is better not to reduce too much the dimensions of the pivots in machines susceptible of a certain strain.

The friction by sliding is proportioned to the pressure for the same bodies employed in the same state; in other words, that if for a given pressure we determine the resistance pro-

duced by the friction, the doubled or trebled pressure will render the friction twice, three times greater. It will be seen by this that it is important to reduce as much as possible the weight of the moveable parts, to ease the strain upon the pivots.

The absolute value of the friction varies with each body; it varies even with the same bodies, if their status comes to be changed, or if some unguent is interposed.

For the metals, the friction of the bearings in their journals, with a good unguent, is approximately the .08 of the pressure. When the surfaces in contact are well ground and suitably lubricated by a greasy body, the nature of the metals does not sensibly influence the friction. Thus, steel may rub either upon itself or upon copper; the result will be the same as to the force transmitted (leaving wear out of the question).

If the contact takes place dry, friction is much more considerable; and the surfaces change rapidly, thus augmenting the friction. Steel rubbing upon copper, may occasion under certain circumstances a loss of 25 per cent.

When light moveable bodies, touching each other at a few points, are put into motion, the common laws of friction are sensibly modified by an element whose resistance had until then been unperceived under a greater pressure; the oil which must unfailingly be spread between the surfaces in contact, causes by its own viscosity, a certain adhesion of the surfaces, and opposes a resistance to the motion. This effect becomes much more sensible when the other resistances have been reduced, as in the last moveable watch parts, for instance; and such is the power of the action which is produced, that a single degree of thickening of the oil in the last pivots completely stops the motion; the simple friction of the thickened oil counterbalances the motive force.

The laws which we have already set up, exist only under certain conditions. But horology does not yet possess sufficient experiences to determine their bearings. The following indications will state the rules which are the most generally admitted in horology, and which should be adhered to for want of a better guide:

1. The friction of sliding, as that of the pivots within their holes, is the same, regardless of velocity.
2. It augments with the extent of surfaces in contact. Berthoud appears to admit that this augmentation is not sensibly increased by a lengthening of the pivots, but that it occurs solely by reason of their thickness, and that it is proportionate to their diameter.* In accordance with this principle, the pivots should be kept as thin as the resistance to be overcome will permit, and if the moveable parts have to withstand a certain pressure, the pivots may be augmented somewhat, not in thickness, but in length, to prevent wear.
3. Friction increases with pressure.
4. It varies with the nature of the metals employed, their condition and the polish of their surfaces. A perfect polish gives the least amount of friction.

Laws attendant upon the friction of rolling are wanting. It may be stated however, from the small number of experiments made in the premises, that for metal, the force lost is in this case embraced between .001 and .003; it is therefore only the $\frac{1}{100}$ or the $\frac{1}{300}$ part of the loss occasioned by the friction by sliding, by which it will be seen how much more advantageous it is to replace this sliding by the rolling friction, whenever it can conveniently be done. Based upon these facts, Sully was induced to support the balance pivots of his marine watch upon rollers, and this ingenious application would undoubtedly still be in use, if the invention of pierced jewels had not been made later on, and it was possible to obtain, joined to a greater simplicity, the same ends. It should be remarked that this discovery appears to have been predicted by Berthoud, because he says in his *Essai*, when speaking of the means which might be used to reduce

*Romilly, a Swiss artist, has made, to clear up this point, a number of interesting experiments, the results of which will be found at length in the article *Encyclopédie méthodique*.

friction, "It would be still better to let the pivots roll in diamond, if it were possible to pierce it with a very fine hole."

ADHESIONS.

The preceding data bear upon cases in which the moveable parts have already acquired a certain motion, and when the question simply occurs upon maintaining it; the results would not be the same if the experiments were made upon bodies in repose, which are caused to pass into one of motion. Under these circumstances a not yet explained phenomenon occurs, with effects variable in its nature: the bodies in contact adhere to one another, and a certain force is necessary to separate them. This adherence is resumed as often as the parts return to a state of repose; they disappear as soon as the bodies commence to move. Only a few instants of repose suffice for an adherence to reach its maximum; a slight displacement is sufficient to overcome it.

The adhesion varies with the manner of separating their surfaces; it is largest when the displacing force is applied in a perpendicular direction.

Adhesion plays a very important part in the rate of timepieces, and its effects are the more worthy to be observed, because they follow no precise rules. This possible cause of irregularity must never be lost out of sight, and if one does not fully succeed to remedy them completely, it is possible at least to prevent in great part the inconveniences which it produces. As they are pointed out, it is easier to provide against them.

Other effects due to adhesion exist than those resulting from simple contact; we will content ourselves with pointing out the different causes which may produce them.

1. The mutual attraction of the molecules of bodies. This kind of adhesion augments with the polish and dressing of the surfaces, as they favor a more intimate contact.
2. The interposition of a couch of humidity. Everyone knows that to lift up a small object it is merely necessary to wet the finger end.
3. The electrical condition of bodies. If the electricity is of a nature different, attraction takes place; if not, repulsion will occur between the surfaces in contact.
4. The magnetic condition, which not alone acts on steel and iron, but also on other metals, although with less energy.
5. The extent of the surfaces in contact, their forms, the nature of the metal, etc.

It is best to prevent as much as possible any contacts alternating between a state of repose and of rest; and in disposing the arrangement where they cannot possibly be evaded, in such a manner that the resistances subject to variation only require a very small part of the force reserved to overcome them. Thus, it is well known to-day that the motor of timepieces of precision must have more power than was formerly given, as well for clocks as for watches. Their excess of force is indispensable to master the variable adhesions which cannot be corrected in any other manner. Care must also be had to separate the pieces in contact by making them slide one upon the other; by which will be prevented a displacement in the perpendicular direction.

DESTRUCTION BY FRICTION.

The friction of metals against each other, with or without aid of oil, may take place in certain cases without causing a destruction of the parts in contact; in other cases, there is wear, and from the time that the polish is attacked, a change progresses rapidly. The observations published by M. H. Robart in these premises may serve us here as guide. There is destruction:

1. If the brass incloses foreign bodies, and principally oxides. This effect inevitably takes place where there exist flaws or air bubbles, the walls of which being necessarily coated by a layer of oxide.

This cause of destruction may be remedied by a pickle which dissolves the oxide layer, without changing the piece. The feeble acids are better for this purpose than the treatment of boiling in some greasy body, as was practiced by the ancient watchmakers.

Pure brass by itself is generally inoffensive.

2. When the wheel has been cut with a new cutter; the fine shavings of the cutter bury themselves in the brass and act like files. Dipping is employed here to advantage, steel being easily soluble in the feeble acids. The scapewheels are ground with care to remove the last traces of any foreign bodies which might have buried themselves in them. They must not be browned.

3. The quality of the steel. The result is often observed, but the causes are not well known. A bad temper may also lead to the wear of the parts.

4. The conditions in which the friction operates, and among other things: The drops of the escapement, or their bad dispositions; the recoils, and, above all, the to-and-fro motion, where the train in the timepiece now operates in one direction, and immediately afterward in an opposite one; the enlargement of the pivot holes may indirectly cause the same effects, by the greater effect which it has upon the drops, the recoils, and the depths; lastly, too great a force employed to move the train.

In accordance with the occurrence, different remedies are employed for modifying the defective arrangements, by reducing the encounters, readjusting the pieces, hardening and polishing the surfaces, and diminishing the motive power. Reduced to a suitable proportion, friction ceases to be destructive, and the pieces are preserved against appreciable change.

It has been observed that the scapewheel constantly wears the cylinder when the former is of brass. The cause for this deterioration is not satisfactorily explained. The cylinder escapement was at one time abandoned for this reason, but since these wheels have been made of tempered steel, the wear has entirely disappeared.

Steel scapewheels not tempered attack the cylinders; the reason is not yet known.

Brass wheels, in certain cases, wear stone cylinders; the reason for this must be sought for in the layers of oxide with which the brass is covered, and which, interposed between the two, acts like a grinding powder. This error is remedied by grinding the wheel, which removes the oxide, and reduces the friction to its normal conditions.

Steel levers of free anchor escapements, after having gone without oil for many years in a good state of preservation, finish sometimes by becoming bad. This effect must be attributed to the same cause, either on the part of the wheel, or on that of the lever. As well known, steel oxidizes with greater facility than brass, and it is equally well known that rust is peculiarly liable to attack metals (polishing red is nothing else than oxide of iron). It is very possible that this deterioration may be avoided by grinding the wheel and repolishing the lever, as soon as a wear begins to become manifest.

5. Exactness of construction. Thus a want of roundness in, or faultiness of, pivots; holes badly made or too large; badly rounded angles; bad depths; incorrect forms; frictions of undue proportion, all contribute toward wear. It is worthy of note that holes of carefully constructed clocks need rebushing oftener than the more common article.

6. A want of cleanliness, either caused by the negligence of the watchmaker or arising from circumstances inseparable from daily use. A polish obtained by using dry rouge upon copper or tin file, rarely leaves the surfaces perfectly clean; small particles of red are always an element of destruction, and must be carefully prevented. It is always well to pass a soft piece of wood over the surface, after having used a copper or tin file and red.

7. The wear of the pivots in their holes, either by the entrance of foreign bodies, or by the oxidation of the brass of the holes.

Precautions to prevent wear.—All the endeavors made-up to to-day to replace brass by other metals or alloys have proved failures; brass of good quality and suitably hammered is the best material which can be used for the train and pivot holes.

Employment of precious stones.—Precious stones have been employed in horology from about the year 1700; the art of piercing them is attributed to a Genevan by the name of Facio; their use lessens the

inconveniences attending the use of oil. Their great hardness renders them almost indestructible, and many of the causes of destruction pointed out are prevented by their use. It has been observed, moreover, that the oil is preserved in better state and longer in jewel than in brass holes. Up to the present, precious stones are held as preferable to all others for holes in which operate the pivots of the last moveable parts, especially those of the balance.

Since jewels would not withstand a strong pressure, they should not be employed for the first wheels. The oil is also better preserved in the first holes than in the last ones, although the former be of brass, and the timepiece labors under a deterioration and thickening of the oil in the last wheel and escapement, although working in jewel holes before the first ones even show a trace of change of the oil. It would consequently be a useless expense, amounting to a defect, to have all the holes of jewels.

Generally, only six jewel holes are put into chronometers, and it certainly is not done to save expenses, because the only aim is to produce them as perfect as possible, and the same could well be observed with watches; the number of jewel holes should not pass beyond eight; the timepiece would cost too much by using more.

Friction with oil.—Steel rubbing against steel, or against a jewel, must always be lubricated with oil, or, at least, grease; otherwise, oxidation of the metal following friction, and later on, wear of the parts by oxide dust would ensue. The pressure must also be moderate, and it is not uncommon to see a cylinder scapewheel cutting the jewel cylinder, although lubricated with oil, either because the tooth drops are too great, or else too heavy a balance is used; again, the motive force is too great. This fault is remedied and wear prevented either by changing or adjusting the pieces, or by diminishing the force of the mainspring. The diamond, although the hardest stone, would not always resist the effects of wear, such as we have pointed out.

Oil prevents oxidation, consequently wear. Steel might be employed for parts which rub on stones, with oil; it should not be forgotten, however, that the thickening of the oil is a cause of disturbance in the rate of the timepiece, and in order to prevent a fault, one is obliged to submit to an inconvenience of another sort.

The diminution of force would be a very good means of lessening the destructive effects of friction with or without oil; but even with this precaution, one is not always assured of the preservation of the rubbing pieces, into which steel enters. It will sometimes be seen that a steel scapewheel cuts a stone cylinder on which it rubs.

In any case, oil by itself is not a cause of destruction; but it may serve as vehicle to foreign bodies, and thus indirectly produce an alteration of the rubbing parts.

Horologists have experimented with lubricating verge escapements, and the oil has caused no destruction. Free escapements would go with oil and not deteriorate, but their rate would alter in the long run.

The cylinder of cylinder escapements must be drenched with oil. Arbor escapements must be lubricated, and the oil carefully put into all the pivot holes.

Dry Friction.—Steel may rub dry, under certain conditions, against brass, without wear; free escapements, those of vertical-wheel watches, and depths all go without oil and do not deteriorate sensibly, because the pressure is moderate, the different surfaces are in proportion with the pressure, and the motion always takes place in the same direction. But in the majority of cases, oil is absolutely indispensable to prevent destruction. Where oil cannot be used, gold or brass should be employed to rub against precious stones.

No oil is used in the canon pinion of watches (steel against steel); but to prevent the oxidation, the pieces are lightly greased.

Brass may rub dry against brass; this disposition however is only used by very light pressure, for example, to the canons of the hour and minute wheels of watches.

Precaution to prevent a wear of the escapement.—The extreme impor-

tance of their nature and purpose, the friction of the scapewheel, must engage all the attention of the horologist, and in the finish of the part, because from the state of its surfaces depends in a great measure the duration of the escapement. We therefore deem it of importance to here state the procedure for suitably treating these kind of pieces, as given by M. H. Robert:

Commence by grinding out all the cutting marks of the toothing with a tin file and ground water-stone and oil, only leaving a few light traces, so as to be assured of not losing the equality of the division. Next pass over it powdered charcoal of soft wood and oil, spread upon a piece of soft wood. Lastly, rub with a brush dipped in the same charcoal and oil. The brush tones down the angles and gives to the grinding a greater degree of finish than that obtained by the wood, and the slight rounding down which it produces is in keeping with the functions of the escapement.

Diamonds and Precious Stones.

Translated for the JEWELERS' CIRCULAR from the French *Diamants et Pierres Précieuses* par Louis Desclaire, Professeur de Géologie et Minéralogie à la Faculté des Sciences de Marseille. 2me éd. Paris, 1874.

[Continued from Page 179.]

HISTORICAL SURVEY OF PRECIOUS STONES FROM THE MOST REMOTE TIMES OF ANTIQUITY TO THE ERA OF MODERN CHEMISTRY—NOTIONS ENTERTAINED BY THE ANCIENTS AND DURING THE MEDIEVAL AGE CONCERNING THEIR NATURE AND PROPERTIES.

Another great glory of the mediæval age, the friend and disciple of Albertus, is St. Thomas Aquinas, whose prodigious researches even surpass in extent those of his master, and who wrote a treatise on the *Nature des minéraux*, in which we find several very curious passages, notably on the artificial fabrication of precious stones. We will recur to it in chapter IX.

Glancing through the works of Arnault of Villeneuve, Raymond Lulle, Paul de Canotanto, Isaac the Hollander and others, we find a certain amount of documents on minerals and precious stones, but they contain nothing new. We now have arrived at the end of the fifteenth century, and are leaving the Middle Age.

At the threshold of the Renaissance we find a singular character, Jerome Cordan (born 1501), who furnished us with some valuable suggestions. Several of his works, published after his death, contain a quantity of extraordinary things, but in his treatise *De la Subtilité*, which we have studied with care, we find many ideas which stamp their author as a man of vast intellect and true sagacity, beneath an air of *bonhomie*. He designates by the name of gems, all brilliant stones, and reserves the appellation "precious stones," to such as are at once rare and of small dimensions. He further divides the latter into three classes: Those which are brilliant and transparent, as the diamond; 2. Those which are opaque, such as the onyx; 3. Those which are formed by a union of the two preceding, the jasper, etc. Cairo, who lived three centuries after Cordan, adhered with but few deviations to this classification.

According to our author, precious stones are developed of juices distilled by minerals in the cavities of the rocks, "in the same manner as the infant is developed from the maternal blood." The diamond, the emerald, the opal proceed from gold; the sapphire, from silver; the carbuncle, the amethyst, the garnet, from iron. He thereupon enumerates the imperfections which precious stones may possess, and makes a remarkable expression.

"In precious stones," he says, "defects are far less common than in animals and vegetables; they are more apparent in the former, because they are more brilliant and rare. For the same reason, men of science appear to be beset with more vices than the generality of mortals; but this is an illusion and error. The splendor of their names and the lustre of their renowns solely, render their defects more glaring, while the ignorant populace may hide its vices, favored by obscurity."

It must be observed that Cordan, having led a very dissolute life,

thus advocated his own cause, while defending men of science in general.

It was admitted without challenge, in his time, that precious stones were living beings.

"And not only do precious stones live, but they also suffer disease, old age, and death."

He then enumerates their several properties. The hyacinth preserves from thunder, pest, and induces sleep. Albert the Great also attributes to it this quality. Cordan confesses that he ordinarily carries a very large hyacinth about his person, but has never been able to perceive that it inclined him sleepiness; but he adds with a perfect naivety that his hyacinth has not the true color, and is, therefore, far from being good. Other virtues were attributed to it; it caused the wearer to become rich, increased power, nerved the heart, carried joy to the soul, etc.

He next treats of the turquoise, which, mounted in a ring, preserves from all harm, should a horseman stumble from his horse; but hastens to add: "I have a beautiful turquoise, which I received as a present; but I have never been tempted to try its virtues, as I do not care, for the sake of experimenting to fall from my horse."

"The sapphire," he further states, "possesses a great many properties, particularly that of curing melancholy." This is very possible. We are convinced that even at our epoch the sapphire and other precious stones have not lost this virtue.

These few examples suffice to give an idea of the properties attributed to precious stones, both in antiquity and the mediæval age. We will close them by quoting the following striking observations made by M. Babinet:

"For all cures of maladies, either nervous or moral, where the imagination may exert a great influence, jewels may be considered as occupying no secondary rank as remedy. By saying to an invalid that an emerald placed under his pillow will cure his hypochondria, or keep away nightmares, allay the palpitations of the heart, stimulate imagination, crown with success his enterprises, dissipate the anxieties of the soul, success is certain, from the very faith which the invalid reposed in the efficacy of the remedy. The hope for a cure is often the cure itself, and in the many numerous cases where the mind has swayed an influence over the body, the imaginary virtues of a panacea must have produced a beneficial effect. Finally, that eternal deception of the human mind, which takes cognizance of all miraculous cases, but none whatever of the failures, contributes to maintain the faith in the occult virtues of precious stones." It is barely fifty years ago since sufferers would borrow of rich families, stones mounted in rings, to apply them to affected parts. When the trinket was to be introduced into the mouth to cure tooth-ache, sore throat, ear-ache, etc., it was secured to a strong thread, as precaution lest the patient might swallow the bauble.

"It is unnecessary to trace at this late day, what has become of all these beliefs and superstitions which once were incontestable to our forefathers. They have disappeared, together with the powerful lunar influences of the time of Louis XIV.—consigned to the vast storehouse of errors and vagaries of the human mind."

It now remains to say a few words on the arrangement pursued in the following pages, in the particular description of precious stones. In spite of all the discussions to which the subject has given rise, and the large number of classifications presented by different authors who have occupied themselves with the question, there does not and cannot exist a general and natural order of jewels—the reason is very simple; these substances, which may be called peculiar emanations of nature, cannot be arranged in a well-defined series. By taking one or several of their general characters, either the crystalline form, or simple or double refraction, composition, relative commercial value, or others, the geometrician, the physician, the chemist, the merchant, will, each one, regard it in a different light, and form an arrangement to answer his own peculiar purposes; but it will never be a natural classification.

Without discussing or criticizing the different methods proposed,

we will adopt in this work a classification based on the chemical composition of the bodies with which we are about to engage our attention, and which unquestionably is the most practical method adaptable for the purpose.

If there were placed upon a table a specimen of each one of the precious stones known at the present day, the collection could immediately be divided into three perfectly well-defined groups, in accordance with their chemical structure.

The first comprises only a single stone—carbon is its principal constituent—the diamond.

The second, by far the most important, embraces stones with aluminum as base—the sapphire, the ruby, the topaz, the emerald, and others.

The third comprises those of silica base—opal, agate, etc.

Thus, carbon, aluminum, and silica constitute the difference of the three divisions.

The following three chapters will be devoted to the history of the precious stones comprised in each one of the three divisions.

Before beginning the research of these three groups, we will state that an ancient custom is still in vogue at the present day, in regard to jewels; they are called *Oriental* and *Occidental* stones. Formerly, these words were used in their full significance, under the supposition that precious stones were only found in the countries of the Orient. It suffices to read the works of antiquities and middle age to encounter this expression everywhere; to justify these appellations, sometimes very fantastical reasons were given.

The two terms which have been retained in commercial language, do not at present designate the places of emanation, but simply as distinction to establish between them. Those of most value are called *Oriental*, the other, *Occidental*, whatever be their place of procurement.

CHAPTER III.

DIAMONDS.

The diamond has for a long time held the first rank among precious stones, and is known from early antiquity. The name *adamas*, bestowed upon it by the Greeks, is found to-day, although more or less altered, in nearly all the modern languages of Europe, yet it may be distinctly recognized. It signifies "the indomitable." The excessive hardness of the diamond fully justifies this appellation, but we find, upon reading works of antiquity, that the ancients attributed to it several other properties which it by no means possesses, such as not heating under action of fire, that of resisting, without splintering, a blow of the hammer. Both Lucretius and Plinius speak of this property, not to go farther back.

Plinius says, "The test of all these diamonds is made upon the anvil, by blows of the hammer; and it causes the iron to recoil in such a manner that it makes it jump from one side to the other; it even fractures the anvil at times." It is plainly seen by this how errors so easily to be refuted, will be handed down in full force throughout centuries. What was necessary to be done by the ancients to inform themselves of the truth or falsity of this statement? Clearly that what our lapidaries do to procure diamond dust.

This opinion of the ancients kept it ground for a very long time. Thus, in 1476, when, after the battle of Morat, the Swiss had seized the tent of Charles the Bold, they found in it, among other riches, a certain number of diamonds, and to test them, they struck them with a hammer, with the inevitable result of smashing them into pieces.

The most ancient diamonds known to the Romans appear to have been furnished by Ethiopia; but already at the epoch of Plinius, they were brought from India. Up to the eighteenth century the only diamond mines known were those of India, in the Empire of the Mogul, and in the Island of Borneo, when, at this epoch, the discovery of the diamantiferous districts of Brazil created a profound disturbance in the diamond market, and completely changed the state of things. To-day, the New World furnishes almost exclusively the

diamonds for the European market, especially since the discovery of the Bahia mines, which at one time were extremely rich.

The presence of diamonds in the Ural Mountains became known in 1829; indications have also been found in South Carolina, and in our French possessions in Africa.

This gem is sometimes found freed of all foreign substance. It is then very brilliant; this is an exception, however. It is generally surrounded with an opaque crust, called *cascath*; this substance is undoubtedly foreign to the gem, not only in its nature, but also in its origin. It is oftenest found in the sands, in the alluvial residues of ancient disintegrated rock, and transported by water from their native places.

For the extraction of diamonds in the mines of this class, the following way has been pursued for a long time: The sands and the diamantiferous earths were transported into an enclosure surrounded by a wall pierced with little holes below, and was let on over these sands, which washed away the finer particles. If the heap consisted chiefly of sand, a single operation was sufficient; but if mixed with clay and analogous earths, it was necessary to let the mass dry completely, and then reduce it to powder by beating it with flails, such as are used for grain, to reduce to powder as much as possible for the water to wash away. Large companies, with plenty of capital at their disposal, to-day undertake the washings in the mines, and apparatus for washings and separation, commensurate with the height of progress of industry, are applied, in place of the ancient methods, but the end is ever the same, to concentrate as much as possible the residue and wash away the worthless sand. The workmen spread out this residue, commencing at one end passing slowly forward, and scrutinize every particle, by letting it pass through their hands. The supervision is extremely rigorous, because if the workman can steal a diamond, they do not hesitate, and in spite of all attention by the agents, a goodly number of thefts occur. The workmen will stop at nothing for the sake of stealing; one of the most ordinary means is swallowing a diamond. Tavernier saw in one of the mines of India, a poor devil who, in order to appropriate a diamond, had it hidden within the corner of his eye. It weighed two carats, and in all probability, was surrounded with the usual coating of *cascath*.

Although the mines of India have ceased to send their products to Europe, and have been distanced by those of South America, the Orient nevertheless demands our respect, since all the handsomest diamonds, the "Star of the South" excepted, have come from that country.

For the following description on the diamonds of India we are indebted to Taverniers, who traveled in Turkey, Persia, and India, in 1679.

"The first of the mines which I visited was in the territory of the king of Visapoor, Province of Carnatica, at a place called Raolconda, five days journey from Golconda, and eight or nine from Visapoor. This mine was discovered about 200 years ago. All around where the diamond is found, the ground is sandy, and full of rocks and coppice, nearly like the environs of Fontainebleau. These rocks contain several veins, from the thickness of a half to a full finger, and the miners have small iron rods, crooked on one end, which they thrust into these veins to draw out the sand or earth, among which the diamonds are found. * * * * * When all

all has been gathered, they wash the sand two or three times, and examine the residue for diamonds. From this source the clearest stones and of finest water are obtained. The only evil is that to draw more easily the sand from between the rock, heavy blows are struck with a large iron bar, which *shocks* the diamond and produces flaws."

Favernier visited several other mines, and gives some very interesting accounts of the life and manners of the diamond washers, detailing several of their devices resorted to for pilling.

"It is pleasant," he says, to see the young children of these merchants and of other country people, from ten to fifteen, even sixteen years of age, coming in and seating themselves under a large tree in

the market place of the town. Each one carries a pair of diamond scales in a pouch suspended from one side, and at the other, a purse attached to the girdle, which contains, in some cases, as many as six hundred gold pagodas. They sit there and wait for someone to come and sell them diamonds, either from the mines in the neighborhood, or some other. If anyone brings them something, it is placed in the hands of the eldest of these children, who acts as chief of the band; he scans it and hands it to the one next to him; thus it passes from hand to hand, until it returns into his own, while not a word is spoken. He then asks the price, in order to make the purchase, if possible, but if he should pay too much, he has to take it at his own account.

"When evening comes, the boys collect all the stones bought that day, examine them, and arrange them in accordance with their water, weight, etc.; they affix a price to each one, as near as possible that at which they would sell it to strangers, and by this last price they see how much profit they may have made. They then take them to the large merchants who have always quantities of stones to assort, and divide the profit among themselves; the one who acts as chief receives one-fourth per cent. more than the others." "Young as they are," Favernier adds, "they know so well the price of every stone, that if one has bought a stone and is willing to lose one-half per cent., another will buy it."

The diamond is known under three distinct molecular forms—forming a very remarkable graduated series: *crystallized*, *crystalline*, and *amorphous*. The first is the diamond *par excellence*, which serves as ornament, when cut. The second class cannot be cut; it is known in commerce under the name of *bort*; it is reduced into powder and serves to cut crystallized diamonds. The amorphous diamond, of a steel grey color, is entirely opaque. It would be of no use when cut, and it is also used as powder, like the preceding. It is designated in commerce by the name of carbonic diamond, carbon, and carbonate.

The diamond is always sold by weight—the carat, which corresponds to four grains of the old French weight, and as it is at present expressed in milligrams it is equal to 0.2055. Although the carat is universally employed in jewelry, it is not exactly the same in all countries.

Brazil	0.205,750 gr.
England	0.205,409 "
Holland	0.205,044 "
Spain	0.205,393 "

The carat is again divided into fractions, $\frac{1}{2}$, $\frac{1}{4}$, etc., to $\frac{1}{16}$ carat, and the gem scales should contain the weight from one-thousand carats down to one sixty-fourth.

Crude crystallized diamonds in lots, and in size from the weight of one carat down, are worth from 90 to 100 francs per carat. Beyond one carat per individual specimen, of course the price changes. In effect, custom has established a rule for the last two hundred years that "the price of two diamonds are in the same proportions to each other as are the squares of their weights." Thus, to-day, a stone of fine water, well cut, without defect, etc., weighing one carat, would be worth about 100 francs, one of two is worth four times as much, or 2,000 francs. But notwithstanding an authority as great as Mr. Helphen, the preceding rule might have applied at the time of Jeffries and Favernier, but it does not answer to-day.

To be Continued.

THE use of diamantine for polishing pivots or other steel articles exposed to wear by motion, should be discontinued. It is in place on those parts polished simply to please the eye, or to protect them against rust, but not for pivot ends. The diamantine, no matter how carefully the article upon which was used may be cleaned, will bury itself in the pores of the steel; wear will bring it out, in a short time, mix it with the oil, and thus produce a grinding mixture to wear down the pivot within a few years. Many a worn out pivot coming under the repairer's glass, has thus been ground down.

A Review of the Different Escapements.

(Translated and compiled from the French, for THE JEWELERS' CIRCULAR.)

THE mechanism by which the motion of the clock train is interrupted in an intermittent manner, is designated by the name of *escapement*. The pendulum disengages a wheeltooth at each of its vibrations, which, in turn, restores to it the force it had lost during the time it vibrated by power of its inertia.

Of all the parts of a clock, the escapement is absolutely the most important, as it regulates the rate, and gives the timepiece its veritable value; all the rest is, so to say, only accessory, and has no other object but to sustain the movement of the pendulum. It is on the escapement, therefore, be it clock or watch, that the horologist must bestow his chief attention; all the precautions imaginable must be taken to render the functions of this mechanism truly constant, regular, and durable. For this purpose, we wish to enter into details, both of theory and execution, such as is justified by the importance of the subject.

By *oscillation* or *vibration* is understood the motion which the pendulum of a clock or balance of a watch accomplishes from one extreme of its excursion to the other. Thus, the pendulum *oa*, Fig.

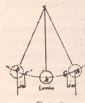


FIG. 1.

1, being supposed to be diverted from the vertical as far as *ob*, then left to itself, will swing to *ab*, which will be a *half* oscillation, to which would be added the demi-oscillation *ab'*, to form the entire oscillation *bb'*. The return oscillation *b'b* drives back the pendulum to the point of departure; and we count *two* oscillations until the pendulum returns to its first position. Each oscillation is divided into two parts, which, it is important, should be considered separately:

1. The lifting arc, *c'e*, divided into two equal parts, by the first point of repose *a*. The pendulum here is constantly under the influence of the scape-wheel; the tooth escapes at the moment when the pendulum arrives at *c'* or at *c*.

2. The supplementary arc *b'e'*, and *cb*. If the motion were reduced to the lifting arc, the least obstacle which would retard the rate would produce a stoppage, because the wheeltooth could not escape. It must therefore have in reserve a certain force which permits the pendulum to prolong its motion beyond this point; and for this, a certain space is left for a supplementary arc to be described in virtue of the velocity required, without further exertion on the part of the train. The supplementary arc on each side does not pass beyond one-half of the lifting arc in clocks, starting at the point of repose, in other words, *bc* is one-half of *ca*. The two supplementary arcs *bc*, and *b'e'*, are equal among themselves, as well as the two parts of the lifting arc *ca*, *ac'* to the right and left of the point of repose.

It will consequently be seen how the escapement performs; the pendulum being at repose *a*, if the train acts, the arc *ac* will be described under the impulsion of the wheel as far as *c* where, the tooth escaping, the pendulum, ceasing to be impelled by the wheel, accomplishes its movement by itself; but the velocity acquired is consumed little by little, it arrives at the point *b* where it becomes null; the motion ceases, and the pendulum, drawn back by its weight, endeavors to regain its repose by describing in an inverse direction the same arc *bc*. Arrived at the point *c*, the train commences to act, and it accompanies the pendulum during the excursion *ce'*, by restoring to it the force it had lost while oscillating by itself. The wheel tooth escapes anew at *c'*, and the motion repeats itself in the same manner by the velocity acquired from *c'* to *b'*, where this velocity again becomes exhausted. The pendulum enters on its return oscillation, etc.

The same effects occur with the balance wheel of a watch—with this difference, that the lifting arc and the supplementary arc are much more extended. The action of the balance spring here replaces that of the gravity, and produces the same results.

GENERAL PRINCIPLES OF THE ESCAPEMENTS.

A pendulum or balance wheel must be located in a manner to vibrate with full freedom. Consequently, 1. It must be suspended in a manner to reduce as much as may be done, any frictions. Special care must be paid to test whether this condition has been more or less satisfactorily complied with, by causing the pendulum to oscillate independent of the clock; the freest suspension will be that which causes the greatest duration of motion.

2. Its connection with the clock train must be such that its prior rate be altered as little as possible, whence the deduction may be drawn that the force transmitted by the escapement should only be sufficient to sustain the motion of the pendulum, with a trifling excess.

3. The transmission of force must take place with the least loss possible, or, in other words, with all frictions reduced to a minimum, and in conditions that it have little variation to fear from the intensity of the impulse. The rubbing surfaces must for this purpose separate by *gliding* one from the other, and not by perpendicular displacements, subject to variable adhesions, whose causes are not yet well known.

The sliding must take place by an easy disengagement of the parties in contact, and not by jolts.

The number of the different surfaces of contact must be reduced as much as possible. With regard to the extent of each surface considered solely, it may vary without inconvenience between certain limits; it is well, however, to adhere to right proportions, in order to avoid destruction or wear.

The number of pieces must be the least possible. Each piece must be arranged with simplicity; so that it may easily be worked, adjusted, and dismounted, if required, independent of the others.

The certainty and constancy of effects must be sought to be obtained before all other conditions; thus, for example, the frictions may be augmented, if by this means, effects more sure and uniform are produced.

The applications of oil should be shunned, where possible, because its use is in the long run a cause of variation. In the parts where lubricating is required, the pieces should be made to suit the purposes of receiving it in quantity and retaining it.

The escapement with the pendulum must compensate any inequalities in the motive force transmitted, also any disturbances produced by the change of temperature.

The pieces must be placed in such a manner as to prevent any wear, and it is especially important for this purpose, 1. That the depths be well constructed; 2. That the impulse of the scape-wheel be imparted at the tangent; 3. That the drops be reduced to the smallest quantity possible; 4. That the pressure be moderate. Especially in watches the escapement must perform in all positions, and in clocks, the pendulum must pass from repose to motion by the sole impulse of the train.

The lifting must not overstep one degree and a half on each side of the point of repose in clocks, and 20° in watches, in all 3° and 40° .

The supplementary arc, or the repose, must not be more than one-half degree on each side, in clocks. In watches, the supplementary arc is precisely the principal element of the regularity of motion; it therefore may be pushed very far without inconvenience, a half turn on each side, and even more.

These principles cannot all be observed at the same time; but they should be put into practice in a measure commensurate with the arrangements adopted. We will next examine the principal escapements, point out their errors and advantages. Several of them are obsolete, and will in all probability never come into use again. We thought, nevertheless, that it might not be useless to speak of them, so as to put inventors on guard not to attempt anything in that direction; and again, because it may not be impossible that sooner or later some of them might be susceptible of useful applications.

To reduce them into some order, in this review of mechanisms, so different one from the other, we shall divide them into two large

classes, clock and watch escapements; each of these classes, will be subdivided again into three others, the *continuous* or *recoil* escapements, in which the train acts constantly on the balance or pendulum; the *dead-beat* escapements, whose action is intermittent, but whose train never ceases to be in relation with the pendulum; and lastly, the *free* escapements, in which beyond the lifting, the balance has no communication with the train.

CLOCK ESCAPEMENTS.

RECOIL ESCAPEMENTS.

Vertical-wheel Escapement, Figs. 2 and 3.—This escapement is the most ancient known, and in spite of its imperfections, is still used in watches as well as clocks. F. Berthoud considered it for a long time as the most perfect.

The scapewheel mn is horizontal, and contains an uneven number of teeth. These are shaped, from the impulse side, by a plane whose obliquity cd is regulated by the possible recoil of the pallet whose plane must never attain the degree of inclination of the tooth; from the other side, by a curve which permits the necessary shake for the free motion of the pallet. The points of the teeth are rather blunt, as will be seen at d' , which eases the shake and prevents wear; ec and ec' are two plane pallets fixed on an arbor, whose motion center is at a . These pallets are distant one from another by an interval equal to the diameter of the wheel.

The wheel traveling in the direction of the arrow, the exposed pallet c has ceded under the pressure of the tooth which is on the point of escaping, and the pallet c' situated behind, advances before the tooth found at the other extremity of the diameter; there is escapement and drop; the pallet c' continues its motion in the same direction by pushing back the tooth, which recoils up to where the pendulum is at the end of its excursion. The pendulum then returns, the exposed tooth c' propels in its turn the pallet c' , which thereupon escapes, etc.

This escapement works without oil, has a brass wheel, and pallets of tempered steel, and remains for a long time without deterioration. It is employed with advantage in common clocks with long pendulums, where the inconveniences of the recoil are absorbed by the inertia of the pendulum. It regulates better when the pallets are more closed, and when their size, in a perpendicular direction to the axle, is rather small. But it has the inconveniences of requiring a horizontal wheel, and therefore an angular depth always more or less defective. The scapewheel being unceasing in its action, any incorrectness of the train necessarily influences the isochronism of the pendulum oscillations, and this escapement cannot be used to obtain a close rate. This inconvenience is not so great, however, as might be supposed, because a corrective is found in the recoil motion, whose retard largely compensates the advance which its greater impulsion might produce in the going, in a case where the force transmitted should be accidentally augmented.

In spite of all care taken to reduce drops by giving them only the smallest shake possible, it is impossible to prevent the encounter of the tooth points on the pallets, by which they are operated under very unfavorable conditions, and would occasion a prompt wear of the rubbing parts, and even of the pivots, if it were to take place under a certain amount of force, as in large clocks. This escapement must therefore be employed only in clocks moved by light weight. Of all

escapements known, this one needs the least motive power for the entertaining of the motion.

Circular escapement of Huyghens, Fig. 4.—The scapewheel b engages here with a pinion c , whose axis carries the claw f , which moves a fly wheel composed of two masses d, d' , whose staffs are fixed by a joint ee' to a plate ee' in equilibrium on a pivot; it is very nearly the contrivance in use in turnspits. When the fly-weight is in motion, the masses part from their position of repose, to where the resistance of air and the friction of pivots establish an equilibrium with the force transmitted. The variations of force produce an inverse variation in the position of the masses, thus constituting a veritable regulator—that is, a mechanism which regulates itself. It is said that it is used in Germany, and gives a very close rate. (Moinet.)

The circular escapement is the only one in which the motion of the train occurs without drop or noise; it might indeed be utilized for certain applications where its conditions are necessary, for instance, for the propulsion of astronomical apparatus to follow the motion of the celestial sphere. This escapement, slightly modified in its form, is still in use for mantle clocks.

The scapewheel is cut ratchet form; the teeth act with their points on the levers b, d and ec of the anchor and propel it alternately, contrawise, their producing the motion of go-and-come of the pendulum in communication with the anchor by means of a fork.

Isochronous anchor-escapement of F. Berthoud, Fig. 5.—The two lifting planes ce, de , are equal each to an angle of 5° described by the pendulum. If the faces of repose were in proportion to the arcs of the circle bt, eg , described from the center a of the anchor, we would have a dead-beat escapement. To make it one of recoil, it suffices to incline these arcs toward bt and eg . These arcs are equally described with the same radii ab, ac , not from the same center, however. To find the two center points, the following must be done: Joining the point b to the center a of the anchor, we mark upon this radius ba the distance bs , which is equal to the thickness of the pallet, and carry three times this distance upon the arc bt , from b to t ; through the center a and the point t , we draw a straight line, which we prolong by a quantity $3s$, equal to this same distance bs ; point 4 , thus determined, will belong to the required arc. To find the center of this arc, it is sufficient to describe from the points b and 4 , with a radius equal to ab , two small arcs which will intersect each other at u ; this point will be the center of the arc bt, u , which forms the exterior face of the pallet.

Likewise for the other face, we carry three times the distance es from e to 3 ; join $3u$, and on this line carry the same distance from 3 to 4 ; the point 4 will be one of the points of the arc sought. It only remains to describe from the points e and 4 as centers, with a radius equal to ea , two arcs of circles which by their intersection will give the center a sought, from which we draw the arc eg .

The recoil escapement has been changed and altered in a variety of styles, all of which accomplish the end; we will not enter into further details, as being irrelevant to the subject; it is sufficient to state that the scapewheel, always ratchet form, in some, moves in direction with the inclination of its teeth, in others, in an inverse one; by some, the anchor embraces only one tooth, in others, it spans over two, three, four, and even more. The sole condition with which this kind of escapement must comply is that the impulses be made at tangent, that is, that the center a of the anchor motion be situated in such a way that the radius ac or ab be perpendicular to the radius nc or nb , when a tooth is exposed for the lifting, by one with the other pallet.



FIG. 4.

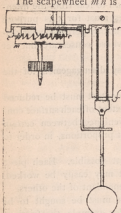


FIG. 2.

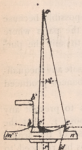


FIG. 3.

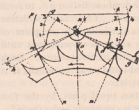


FIG. 5.

Workshop Notes.

Blued steel parts may be whitened by dipping it in muriatic acid, wipe quickly, and lay them for a short time in oil to prevent rust.

When oak wood is used for clock cases, be careful to have it thoroughly seasoned; the tannic acid contained therein is apt to have a damaging effect upon the oil. All danger is past with oak wood well dried. Cedar wood also appears to have a bad effect on oil.

Cleaning old bronzes.—A good way to clean old bronze ornaments is to give them a good wash with soap and cold water which has been boiled with a little soda in it. When dry, rub them over with an oily rag, and by rubbing afterwards with a clean soft rag it will clean all the surplus oil off and give it a good face.

Resilvering watch dials.—First thoroughly clean the dial, then, with a clean cork, rub on the following mixture—nitric acid, 1 oz.; white arsenic, 4 grains; fine silver, $\frac{1}{4}$ oz.; cream of tartar, 1 oz. When well plated, wash in clean water to remove all trace of acid, dry, and varnish with a light clear varnish; same as used by photographers.

An elastic, water-tight grinding stone may be made as follows: Take 100 parts caoutchouc, add 25 parts sulphur, mixed with from 450 to 1,000 parts of cutting mineral, such as emery; press the well-kneaded dough under hydraulic or other pressure, first subject it when yet in the forms, and also afterward, when loose, to about 300° C. of heat.

For the production of emery stones and wheels, use a cementing mass composed of 77 kgr. glue in some water, and 23 kgr. tannin in 23 litres or strong methylalcohol. Intimately mix with this mass, 600 kgr. emery powder heated to 105°; the mass is heated to 105° and compressed, and at this heat first dried within, and afterward completely when removed from the forms.

To remove a tightly fitting cylinder plug, take the cylinder out of the collet, and give it a few light blows with a hammer around the spot where the plug is fastened. The effect of this is the widening of the shell, and the plug is easily withdrawn. Else put a little oil into the cylinder and heat it over a lamp; the oil will penetrate into the shell, and the plug can be removed.

To cement ivory.—To cement broken pieces of ivory in a substantial and durable manner, prepare and use the following cement: Dissolve 1 part isinglass and 2 parts gelatine in 80 parts water, filter, and evaporate down to one-fifth part. Next add $\frac{1}{2}$ part alcohol, in which a little mastic has been dissolved, and finally add 1 part zinc white. The cement is used hot and stirred.

Watch glasses may be reduced in size as follows: The glass being secured between the corks, fixed in the turns, and motion produced by means of the gut-bow, by pressing another piece of glass upon the edge of the glass which requires to be reduced will have the desired effect; and although the edge of it will be other than bright, such will not be noticed when in the bezel-groove.

The Berlin Polytechnic Society publishes the following silver alloy which may be tempered and annealed like steel: 100 parts silver, 3.5 iron, 2 cobalt, and 0.5 nickel. When at glow heat and plunged into cold water, it is said that the alloy becomes glass hard in hot water, spring hard. It is in use already in horology for springs, and pivot holes, and is praised for its handsome color, capacity to take a high polish, and resistance to atmospheric influences.

To restore the original color of an article which has been soldered, or boiled in acid, it is only necessary to carefully rub with a brush, buffstick, or cloth with a little tripoli and oil, which will restore the color. The article is then washed with warm water and soap, and polished with red. The pale color may be prevented by coating the article to be soldered with a batter of borax, mixed with a little cream of tartar, whereby its original color is not changed, and it may at once be polished after the operation.

A valuable plastic material has been introduced in Germany for ornamental and other purposes. Five parts of sifted whiting are mixed with a solution of one part of glue, and, on these two being well worked up into a paste, a proportionate quantity of Venetian turpentine is added, in order to prevent brittleness; a small amount of linseed oil is also put with the mixture to obviate its clinging to the hands, and the mass may be colored by kneading in any color that may be desired. The substance thus formed may be pressed into shapes and used for the production of bas-reliefs and other figures, and may be likewise worked by hand into models—the hands to be rubbed with linseed oil, and the mass to be kept warm during the process. On becoming cool and dry, which takes place in a few hours, it is as hard as stone.

The so-called Spence's metal, says Prof. J. W. Mallet in the *American Chemical Journal*, a fused mixture of iron pyrites or other metallic sulphides with excess of sulphur, seems worthy of some attention, especially for making the joints of water pipes, etc., although the claims put forward on its first announcement were rather extravagant. Its melting point is reported as low as 160° centigrade, it has a considerable amount of cohesive strength, resists exposure to air and water, and costs very little.

A steel grey upon brass and copper is produced by exposing the article, thoroughly cleaned by heating, in a bath of muriatic acid, to which a minimum quantity of arsenic has been added, which mixture is contained in a leaden vessel. The immersed article, as soon as it comes in contact with the lead, will become at once coated with a handsome iridescent grey deposit, which changes color several times, and at last becomes uniformly grey. When to satisfaction, take out the article and dry in sawdust. I obtain the arsenic deposit by galvanism, which is far more certain, less troublesome, and gives better results.

Cold silver wash.—The articles intended to be silvered, of brass, copper or iron, are well cleansed. Iron must be dipped for a moment in a very diluted solution of sulphate of copper, and then rinsed; whereby it receives a thin copper coating to which the silvering adheres. Then prepare the following powder: 3 parts dry chloride of silver are pulverized together with 3 parts of cooking salt, 2 parts prepared chalk, and 6 parts potash. Take a small quantity of this powder, dampen it with a few drops of water, and take some of this paste on a cork and rub the clean metallic surface with it, until silvered.

Burnishing a brass wheel.—When the wheel has been riveted upon the pinion, turn a groove around both, lay the wheel upon a flat cork and grind out the strokes and marks with a blue waterstone, take care not to touch either pinion or wheel. Finish by giving it a fine smoothing, again laying the wheel upon a cork, and grind with a three-cornered tin file and fine water stone and oil. Then clean it carefully with a soft brush and warm soap water, and polish with a well-cleaned burnisher. Before doing this, lay a few thicknesses of silk paper upon the cork and burnish with short strokes and with easy pressure.

Says a writer in a German periodical for goldsmiths: The art of counterfeiting silver has at present arrived at such a state of perfection that the silversmith, when buying broken pieces, should take great pains to examine each carefully. Especially is this true with regard to the present German silver. The color of this is always somewhat yellowish grey, and never as clear and white as 13 part silver. Its appearance upon the touchstone is a little reddish, playing into steel grey. The surest proof is the test upon the touchstone, with pure nitric acid. If of German silver, the stroke will evanesce within a few seconds, without leaving a trace, while silver appears like milk-white lime. Pure acid must be used. One kind of this acid destroys the proof of the silver, and this might accidentally be deemed a counterfeit.

According to the *Chronique Industrielle*, considerable quantities of beautiful objects of artificial amber are now being produced in Vienna, and sold as of real amber. The substance employed is chiefly colophony, or resin, obtained by decomposition of turpentine, though several other ingredients are used to give it the requisite qualities. The imitation is so perfect that the product has the electric properties of true amber. Ingenious manufacturers have even introduced into the substance foreign bodies, insects, etc., to make similarly more striking. Natural amber requires a temperature of 285° to 287° C. to fuse it, while the imitation becomes a liquid at a much lower temperature. Also, true amber is attacked, and slightly by ether or alcohol, and only after a long time, whereas the other loses its profile on contact with these liquids, and becomes rapidly soft.

Swiss rotary cutters for the wheel-cutting and rounding-up engine must be very correctly produced to an angle of 45° to secure a smooth cut. These cutters are not easily made; some skill and much experience is required. The best hardening process is as follows: Make up a mixture of white-pine resin and some ordinary whale oil, melt both together on the stove. Melt the resin, but don't heat it any more; add just enough whale oil to make a moderately stiff paste; stir it well, set aside to cool. In a glass bottle corked up, or a tin box, this mixture keeps for many years. If you want to harden your cutters, grease them very well over and over, put them on a charcoal heat with the blow-pipe good red hot, and plunge them in cold water. When they are taken out they look somewhat grey sprinkled. No tempers are drawn out at all. Take an iron slab and grind with oilstone, and polish with rouge, support them on a cork, place in the vice, and your cutters are ready for rotary purposes.

Business Notes.

Foreign Gossip.

Trier Bros. have just received direct from the manufacturers in Europe, a very attractive line of opera, field and marine glasses.

F. D. Johnson has opened a jewelry store in Lynchburg, Va. His old establishment at Culpepper will continue as a branch house.

Mr. Le Boutillier, of Messrs. Le Boutillier & Co., recently arrived from Europe with a large importation of fine French clocks of exquisite design and novel ornamentation.

Mark L. Raymond, who is very well known in Maiden Lane and over the country, has made an engagement with Hall, Nicoll & Granbery, and intends to travel in the west.

Just as we go to press we learn of the death of J. E. Caldwell, of the well-known firm of J. E. Caldwell & Co., of Philadelphia. He died at his residence in Germantown on the 24th ult.

Miller & Gregg have given up business in Bellefontaine, Ohio, for the purpose of conducting a wholesale jewelry business in this city. They have fitted up an establishment at No. 3 Maiden Lane.

One of the attractions in the Smoky Island Exposition at Pittsburgh, was an American lathe in the exhibit of Messrs. Hodge, Goddard & Co., who had on view a very interesting display of goods.

McCarthy & Hasbargen, importers, have on view a large variety of novelties in jewel boxes, mantel sets, vases, card receivers, Vienna bronzes, etc., of classical and modern designs, also novelties in similar goods from all parts of the world.

Messrs. Hale & Mulford, and Champenois & Co., have each introduced a new design of lever buttons in gold. While the principle on which the various lever buttons work is substantially the same, they differ somewhat in their construction. There are many styles in the market, and new and improved designs are being constantly added.

Edward Thrall has just completed for C. L. Davis the actor known as Alvin Joslin, a beautiful watch in a very elaborate case, with a portrait of the actor in a favorite character painted in enamel; on the reverse is an elegant artistic design in raised gold embracing an appropriate inscription. The case is surrounded with $\frac{1}{4}$ karat diamonds, and is altogether an elegant and reliable timepiece.

The Middletown Plate Co. have in addition to their usual assortment of new goods in fine silver plate, a very elegant assortment of foreign glass, exquisitely mounted, in card receivers, jewel boxes and toilet sets, berry and fruit dishes, vases, etc. The aqua marina goods with fish and coral decorations, and the new effects in jewel boxes, in blue brocatelle are especially attractive.

Dennison Manufacturing Co. have issued an elegant catalogue with photographers' illustrations of all goods manufactured by them. It is one of the most elaborate works that has been issued this season, and the illustrations only need color to render them perfect examples of the goods themselves. The Dennison Manufacturing Co. are the largest manufacturers of goods in their line to be found in this country, and their reputation is as deserving as it is great.

The Ansonia Clock Company has recently issued an elegant brochure illustrating the destruction and rebuilding of their extensive factories, while the text consists of a historical sketch of the formation and progress of the company. The work is beautifully illustrated with lithographic and steel plate pictures of their various factories, the ruins of those burned, and the elegant structures that have taken their places. The work reflects great credit upon the artistic tastes of its projectors.

One of the handsomest, neatest, and best appointed jewelry establishments in this city is that of C. G. Alford & Co., No. 200 Broadway. It is a light, airy office, finished elegantly in light woods, and fitted with every convenience and appliance calculated to secure the comfort of customers and friends of the house. Visitors will here find every convenience for transacting their business, and can write their letters in entire quiet and privacy, at the same time meeting with the utmost courtesy and attention, which will make them feel at once that their welcome is genuine.

T. W. Gesswein, of 39 John street, manufacturer and importer of tools, machinery, and general supplies for watchmakers, jewelers, watch, clock and watch case makers, silversmiths, engravers, and all others connected with the trade, has one of the finest stocks of goods to be found in the city. It embraces everything required by workmen in the workshop, the factory, or at the bench, from the finest and most complicated machinery to the simplest tools and supplies. Mr. Gesswein is the manufacturer of Kisselmeier's patent self-centering lathe for watchmakers, one of the best scientifically constructed lathes in the market. Mr. Gesswein, a thoroughly practical man, is familiar with the requirements of the trade.

The oldest bronze figure is in the collection of the museum of Napoleon III. From the inscription in cuneiform characters it dates from a king of Babylon, who reigned twenty-one centuries before our era.

Mr. Joseph Kohchlitter, of Milan, Italy, horologist of the Exposition of the Royal Marine, has exhibited a very remarkable piece of horology at the Exposition at that place, being an astronomical clock with an electric current, indicating by means of a conical pendulum, differences of time of 1-100 parts of a second.

Count Hugo Enghen, in Tyrol uses microphones buried in the ground and simply connected with a battery and telephone, to discover springs of water. He intends to try experiments at night, as the tremblings and disturbances of the ground are less, caused by the business pursuits of the day. He thinks if a vein of water flows in the neighborhood, the bubbling sound will betray its presence to the microscope.

While making excavations near Westminster Abbey for the purpose of building a school, the workmen came upon old walls, within which church pews were constructed and hung in such a manner that its occupant was forced to maintain a certain position of body, for the purpose of preventing him from going to sleep, since by the least untoward motion he would be pitched out.

Mr. George Rümker, President of the German Marine Observatory, Hamburg, Germany, sent us his annual report of the testing of chronometers, during the winter of 1880-81. They were exposed, at ten days' interval, to 5°, 10°, 15°, 20°, and 30° Celsius, the degree of heat being rigidly sustained, as near as possible; the lowest decrease of temperature was +4.1°, the highest +30.9° C. Several chronometers of Mr. Ekergrén, Switzerland, only held low grades, which, when taken apart, was found to be due to the fact that the balances were highly magnetic. The Imperial Admiralty purchased four—one at M. 1,500, one at M. 1,200, and two at M. 900.

According to the extract from the Report of the Chamber of Commerce, Besançon, Switzerland, "the consumption of watches has decreased during the past year, which has not failed to exert its influence on the wages of the workmen, not to an alarming degree, however, and not exceeding the average fluctuations of kindred industries. This decrease is, as said, of small importance, but a sign not to be slighted; the endeavor to extend the watch market into France, has met with indifferent success. The chief reason lies in the fact of the great decrease of exportation to the United States; but we are now enabled, owing to the excess of workmen and its consequence, depression of wages, to manufacture certain kind of watches cheaper, which still will enable us to hold the market."

In the cellar of an ancient building on the Boulevard Henri IV, Paris, was unearthed an exquisitely chased silver pitcher of the latter years of the fourteenth century, representing Hell. The foot of the Blessed Virgin is placed upon the hideous head of an allegorical representation of Hell. Within the arabesques is Satan, seated upon his throne, and chained; a man and woman, in criminal conversation, are suspended by the tongue, representing, perhaps, lust; Judas also hanging, with his entrails out; a lot of damned waiting to be roasted, and one poor devil completely run through with the spit. Two little demons, placed to the right and left of the jaws of the monster's head, serve as porters, and await with impatience a cartload of fast men, among whom may be noticed a friar, a bishop, and a crowned head. It has been sent to the Louvre.

A clever case of theft lately occurred in Paris. A finely dressed gentleman goes into one of the largest jewelry shops near the Palais Royal and desires to examine some fine *tabatières*; several are shown to him; he hesitates between one of 100,000 frs. and one of 25,000 frs. At last takes and pays for the former and leaves. He returns next morning; "Monsieur, I am so sorry that I did not take the second one; I bring you 25,000 frs., which please count." The merchant counts the money and finds it all right. "Now, I gave you 100,000 frs. yesterday, 25,000 frs. now, which makes 125,000 frs., and the snuff box which I return, at 100,000 frs., completes the 225,000 frs., please serve me the other." The merchant, who had stood for a time, is unable to see the fallacy of the calculation, goes to the show case, takes out the other one and hands it to the customer, who politely bows himself out, without "standing upon the order of his going."

Trade Gossip.

The price of diamonds is advancing.

Emeralds are coming into fashion again.

Sapphires are the favorite gems worn by ladies.

F. W. Bartlett has opened a jewelry store in Fredonia, N. Y.

C. Henry has established himself in the jewelry business in Canton, Ohio.

C. Von Kanel is reported to have opened a jewelry store in Massillon, Ohio.

The latest freak of a fashionable seaside belle is to silverplate the corns on her feet.

Many a woman who turns up her nose at imitation butter wears oleomargarine jewelry.

A. M. Hill, of New Orleans, was recently married to Miss Lillie Twomey of Brooklyn.

Onyx jewelry still maintains its high rank in the goldsmiths' art, and is as fashionable as ever.

Sneak thieves have commenced their fall campaign on the jewelry stores a little earlier than usual.

An affectation in jewelry at Saratoga is to wear a solitaire sapphire sewed in one ear and a ruby of corresponding size in the other.

Every member of the Jewelers' League promptly responded to the last assessment call, for the benefit of the family of poor Joe Acheson.

A jewelry salesman has been arrested in this city for selling goods below the standard they were represented to be. He was held for trial.

A Brooklyn watchmaker named Kennard recently married Miss Byass, and several spiteful girls who wanted Kennard themselves have cut Byass.

Samuel Baldwin wears a magnificent diamond, presented him by his employers, Walter E. White & Co., as a mark of their high appreciation of his services.

Mustapha Bey, ruler of Tunis, during his stay in Paris, purchased 60 watches, 60 of which were made by the American Watch Company, of Waltham, Mass.

The store of Cowell & Hubbard of Cleveland, is one of the handsomest jewelry stores in that city, and is described by the travelers as being a perfect little palace of neatness.

H. L. Street, son of Mr. George O. Street, has been admitted to membership in the firm of George O. Street & Sons. Mr. Street is one of the oldest established jewelers in town.

The banks in Chicago are compelled, by the scarcity of currency, to pay out a large proportion of gold, and many of their customers complain of the inconvenience occasioned by it.

Excursion tickets from this city to the Exposition Grounds at Atlanta, Ga., will be sold during the months of October and November, at \$36, good to return within 30 days from date of purchase.

Costly enamels in the Benvenuto style, with lockets either sacred or profane, made by the famous Froment Meurice, are superseded from the delicate chateaux of gold or silver, now so fashionably worn.

The Howard Watch and Clock Company has just put up one single and two double dial clocks in the lobby of the New York Post Office. They are very handsome, and will prove a great convenience to the public.

The gold mounted crucifix which Columbus held when he first landed in America is asserted to be in the possession of a lady in Colorado. But as the Boston Museum, Barnum and a wealthy New Yorker each own the crucifix, the one in Colorado can't be genuine.

The number of business failures for the first half of 1881 was 2,862 against 4,018 for the same period in 1880. The figures of these failures, taken as a whole, indicate a stability and strength in the condition of the great mass of the commercial community is in happy consonance with the condition of the country generally.

The pearl fisheries which have just closed in Ceylon are said to have been the most successful on record. The pearls produced from the oysters taken from the west coast of the Island of Silavatai have been famous from time immemorial for their purity, shape and color, and far surpass those taken from the Persian Gulf, although they are as a rule, inferior to the latter in size.

In jewelry there are many curious fancies. The combining of precious stones is a marked feature. A bracelet with a mounting of a toad's head has a diamond of satin-like whiteness set between the eyes, which are pure emeralds; the nose is adorned with a sapphire, and the mouth is opened just wide enough to hold an opal.

A firm of English manufacturing jewelers in Birmingham, England, was recently sued by a retail dealer for misrepresenting the quality of gold contained in a bracelet, which, it was shown, was partly brass, instead of all gold. The plaintiff won the case, but by consent, the case was settled by a verdict of \$50 against the defendant.

Louis Engle, traveler for the firm of Van Moppes & Marx, of this city, while in St. Louis recently, encountered an adventurer named B. F. Parker, who had given him a bogus check for \$1,400. By a brilliant strategic movement he succeeded in compelling the fellow to disgorge \$500 and thirty-one karats of small diamonds.

The Morse Diamond Cutting Company has sold its entire stock of fancy and colored stones to Richard H. Roberts and J. D. Verrington, and these gentlemen have formed a copartnership for dealing in all colored and fancy gem stones. The new firm will be known as J. D. Verrington & Co., their office being with the Morse Diamond Cutting Co., at 192 Broadway.

Charles Baxter, the junior partner in the firm of Joseph Scheina & Co., manufacturers of clocks, is reported to have fled from the country, taking a large amount of money belonging to the firm. It is said that he had been speculating in Wall street, and had lost a good deal in mining stocks. His partner is unable to learn the extent of his losses, as the fugitive took the cash book and ledger with him.

An employee of George W. Shiebler, a well-known silversmith, took an unfinished bell to be chased, calling in at the office of a prominent banker in Wall street, he laid the bell on the counter, and went away forgetting it. When he discovered his loss he returned, and found the innocent bell had been mistaken for an infernal machine and thrown in the ash barrel. Sharp fellows, those Wall street bankers.

Quite a number of jewelers, especially in large towns and cities, have added to their stock a select line of stationery. It may interest many of them to know that about \$10,000,000 worth of writing paper is manufactured in the United States annually; but when a young man's best girl goes into the country to spend the summer, and doesn't write him more than one letter a month, he looks upon the foregoing assertion as a species of watering place correspondence in which truth abideth not.

Willis P. Middleton, in the office of Middleton Bros., who were his father and uncle, was drowned at Lake George in the early part of September. He was bathing, and being a good swimmer, dove from the end of the pier. He arose to the surface, signalled for help, and then disappeared. His body was recovered immediately, but all efforts to resuscitate him failed. It is supposed he died of paralysis of the heart. He was but 23 years of age.

During the recent races at Hartford, Conn., Mr. E. N. Welch, the well-known clock manufacturer of Bristol, Conn., while getting off a train, had his diamond pin, valued at \$7,000, stolen. It had been in the possession of his family for many years, and was greatly prized by the owner on that account. A middle-man of this city opened negotiations for its return on payment to the thief of \$400. Mr. Welch advanced the money and a Hartford policeman returned with the property.

It has been discovered, after a doleful lapse of time, that there is not the slightest bit of evidence in the world connecting Mr. Meyer Goldsoll with the unfortunate causes leading to the melancholy collapse of the St. Louis Broadway Savings Bank, and a *notit pro*, has been entered in his case. The thoroughness with which this Bank was plundered and smashed, led the public to hope that some of the knaves who really did the work would secure steady employment from the state—merely by way of awful example—but it seems that the concern was destroyed by spontaneous combustion, and that nobody was in the slightest degree responsible for the misfortune.

A. B. Griswold & Co., jewelers of New Orleans, one of the oldest houses in that city, have asked their creditors to grant them an extension. One of the members of the firm has been in New York and has secured the acceptance of a majority of the creditors to the extension, which is to extend over a period of four years. The firm propose to pay 25 per cent. of the indebtedness each year until the whole is liquidated; there are to be five payments a year of 5 per cent. each, beginning Jan. 1, without interest. The liabilities are \$60,000 and the nominal assets \$85,000. The business was started 40 years ago. Mr. Griswold died in 1877, but his interest continued.

Merchants in all walks of business honored the memory of the late President by dressing their places of business in the habiliments of mourning, but no branch of business did more in this way than the jewelry trade. The draperies in Maiden Lane, John and Nassau streets were among the most imposing in the city, while the decorations on the Waltham building in Bond street, the Whiting manufacturing building, corner of Broadway and Fourth streets, and Tiffany & Co., Union Square, were especially noticeable for the elaborate and taste displayed in the arrangement of the emblems of woe.

The Secretary of the Treasury has clearly defined the status of mutilated coin. He says that there is no provision for its redemption by the government, but intimates that everyone has the right to sell it as old gold or silver. Among the metals may be included the United States, for any citizen may deposit bullion at the Assay Office and receive its value when this is determined. Between mutilated coin and worn money there is a distinction; for the wear of metallic currency in use is overlooked by the government as long as there is enough of the inscription left to signify the denomination. Mutilation, however, is willful and not accidental, and the loss must be sustained by the holder. As none of our silver coin is intrinsically worth its face value, the moral is that everyone should refuse—as he legally has the right to do—any coin that has been clipped, punched or drilled.

Captain Cook, the Ohioan who slapped the face of the man who made a heartless remark about the President, has just received a watch, chain and locket from the admirers of that energetic proceeding. How many these admirers are may be conjectured from the fact that the fund which served to purchase the gift was made up from contributions of one cent. The movement is a fine nickel, 16-size, four and a half pair ruby jewels in gold settings, exposed pallets, patent regulator, compensation balance, and fully adjusted to temperature, isochronism and position, made by the American Watch Company, of Waltham, Mass., and is handsomely cased in gold, bearing appropriate decorations and inscriptions. The man whose face was slapped is said to have been observed standing before the shop wherein the watch was exhibited, and viewing the gift with "embarrassment and chagrin."

All over the civilized world myopia, or near-sightedness is becoming alarmingly prevalent. Much study of miserably printed books, especially in imperfectly lighted rooms, has had a great deal to do in inducing this serious misfortune. But that is not the sole cause. Too frequently it can be traced to a general lowering of the vitality of the patient, produced by competitive examinations, low diet, badly ventilated rooms, lack of general society, etc. It goes without saying that the sight must be impaired when the body is weak. A society in Leipzig has lately tried the experiment of improving for a time the living and sanitary conditions of 131 children with the effect of increasing bodily strength and strengthening the sight. Some of the children were sent to the seaside and others to the country. At the end of six weeks the weight of each child was $1\frac{1}{4}$ kilograms more than it had been before, the chest was considerably expanded, and the sight was much better. This experience well deserves the attention of parents.

It is reported that a stock company has been formed in Paris with a capital of \$8,000,000 for the purpose of giving legitimate pawnbroker's business in Canada, conducted through numerous branches under the general system which has proved successful in various countries of Europe under the name of Mont-de-Piété. The scope of the Mont-de-Piété is two-fold; it supplies the temporary personal needs of the wages-earning classes, and also the temporary financial embarrassments of small tradesmen and manufacturers. It is in fact a well-conducted institution for lending money secretly on all kinds of movable chattels capable of being stored as security in the warehouses of the lender. The rate of interest is of course higher than that charged by banks, but much lower than that charged by English pawnbrokers, the Canadian cogeners, or Toronto sharks, who ask three per cent. a month for money loaned to the poor on chattel mortgage. It is to be hoped that the Paris company will adventure their capital, but we doubt whether the poor of Canada are poor enough to require aid to any great extent from the proposed institution.

The New York Jewelers' Association, headquarters at 692 Broadway, corner Fourth street, held its seventh annual meeting on Tuesday, Sept. 13. The following officers were elected for the ensuing year: President, Ethel C. Hine, of E. N. Welch Mfg. Co.; Vice President, Wm. R. Atling, of Alling & Co.; Treasurer, Thos. G. Brown, of Thos. G. Brown & Sons; Executive Committee, Jos. F. Chatellier, Chairman; Finance Committee, John A. Riley, Chairman; Membership Committee, L. J. Mulford, Chairman; Secretary, H. Olmsted.

An appointment of the Executive Committee still remains, and from his report we extract the following: "The members have received during the year by daily issues, an aggregate of 990 inquiring sheets, containing 5,473 names; 975 report sheets, containing 5,483 names, on which were 10,748 reports as to the commercial standing of purchasers in the states and Canada, given by fellow members from actual business experience. The reports embrace failures, protests, requests for and by draft or otherwise, return of drafts unpaid, compromise settlements, mortgages, judgments, deaths, arrivals, etc. A mass of information that cannot but be valuable to the members.

The Jewelers' Protective Union notifies the trade that several expert sneak thieves are now known to be operating in the west, and warns travelers to look out for their trunks and other valuables. About the time this notice was sent out, Pinkerton's men were hot on the trail of one Cummins, a notorious thief, said to be implicated in the robbery of Messrs. Enos Richardson & Co.'s trunk at Baltimore. Cummins was arrested at Racine, Wis., for robbing a traveler, and hearing that he was wanted by the Jewelers' Union, pleaded guilty to the Racine robbery, in order to evade Pinkerton, and was sentenced to three years imprisonment. Walter Sheridan, a pal of Cummins, and one of the most expert thieves in the country, has also been captured by the Pinkertons in Philadelphia, and is held in \$10,000 bail for the robbery of diamonds from the jewelry store of J. K. Davis of 939 Chestnut street. Since his arrest Sheridan has shaved off his beard, evidently to avoid identification, but, notwithstanding this, he is positively identified. It is due to the persistent efforts of the Jewelers' Union and Messrs. Enos Richardson & Co., that these thieves have been captured and sentenced to imprisonment.

Mr. John Ashleman will be remembered by the trade as an old merchant in Chicago, who was twice burned out in that city, once in 1871 and again in 1874. He was then well advanced in years, and now, in his old age, finds himself prostrated with sickness and destitute of means. He was also embarrassed by a debt of \$6,000, due to New York dealers. Mr. Ashleman was a liberal buyer before misfortune overtook him, and an upright honorable man, whose entire business career was characterized by the strictest integrity and honorable dealing. When the facts regarding his destitute condition were made known here a few weeks since, every one of his creditors gave a receipt in full for the amount due, and most of them went still further and made a contribution for his benefit, one of his largest creditors signing off the indebtedness and giving his check for \$100. Quite a sum was raised in this city, the amount being forwarded to Stedman H. Hale, of Chicago—who is always to the front when a charitable deed is done—and an opportunity will be given the trade in that city to show their appreciation of the long and honorable business career pursued by Mr. Ashleman. Since the above was in type, we are notified of the death of Mr. Ashleman. The sad news will be learned with regret by a large circle of friends who knew him in his more prosperous days.

The New York Jewelers' Club have presented the Providence Jewelers' Club, who vanquished them in the base ball contest, the following resolutions, handsomely engrossed and appropriately framed, as a mark of appreciation of the generous entertainment during their visit to Providence: "The New York Jewelers' Club to the Providence Jewelers' Club—*Whereas*, The New York Jewelers' Club on July 6, 1881, visited Providence at the invitation of the Providence Jewelers' Club, to engage in a friendly game of base ball; and *Whereas*, The New York Club having been right royally received and entertained by their Providence brethren, and they deeming it right and proper to give a suitable expression of their appreciation of the many favors received on that occasion, therefore be it *Resolved*, That the members of the Providence Jewelers' Club are proficient in the art of entertaining, and on the occasion referred to left nothing undone that could add to the comfort and pleasure of their guests. *Resolved*, That where everyone did his "level best" to make it agreeable to us, distinctions between individuals would be evaded, and we refrain from mentioning any names as entitled to especial consideration, but desire to express our thanks equally, to the members of the various committees, and the members of the Club, all of whom lived with each other in their efforts to contribute to our entertainment. *Resolved*, That the New York Jewelers' Club heartily appreciate the generous hospitality and delicate consideration extended them by the Providence Jewelers' Club, and, in due season, reciprocating the compliment. *Resolved*, That we wish the greatest amount of prosperity, health and happiness to our generous hosts, and trust the bonds of fraternal friendship may be still further strengthened by future exchanges of hospitality."

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*The recognized organ of the Trade, and the official representative of the
Jewelers' League.*

A Monthly Journal devoted to the interests of Watchmakers, Jewelers, Silversmiths, Electro-plate Manufacturers, and those engaged in the kindred branches of art industry.

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A New Bankrupt Law.

AT the last session of Congress, some consideration was given to the subject of a new general bankrupt law, but no definite action was reached. The sentiment of the business community, however, seemed to be in favor of such a law, and, consequently, the Senate Judiciary Committee was instructed to sit during the summer recess, for the purpose of collating the views of the commercial classes, and from them evolving a bankrupt law that should avoid the mistakes of the old one and be generally satisfactory. In carrying out this plan the Committee has addressed circulars to the various boards of trade, and to individuals who have shown special interest in the subject, and from them have received many valuable suggestions. No single interest in the country is more interested in this subject than the jewelry trade. Dealing in goods that are conceded to be in the nature of luxuries, they are naturally forced to sell largely on credit, and the matter of collecting bad debts is one of serious importance. Heavy losses are annually incurred through the system of compromising on any terms offered by a debtor, and the fact that such compromises could be easily made has tended to largely increase the number of dishonest debtors.

It being conceded that a new bankrupt law is needed, such a law should, to avoid the errors of the old one, provide that salaries, and not fees, should be paid to all officers under it, and that the power of registers should be greater than they were under the Act of 1867; that the amount of indebtedness authorizing the filing of a petition should exceed \$500, the average suggested being \$1,000; that composition settlements, if carefully guarded, should be continued; that the discretionary powers of the Court as to granting discharges should not be increased above those granted by the old Act; and that the new law should work simply, speedily and economically.

The hearing which the Committee will probably give in several of the principal cities during the present month will undoubtedly lead to many practical suggestions that will result to the advantage of the commercial classes.

At the last session of Parliament, a bill was introduced to amend the existing bankruptcy law of England. Its consideration by Parliament led to profound discussions of the subject, both in and out of legislative halls, some distinguishing persons contending that the whole matter of settlement between debtor and creditor was of a private nature and should not require special legislation. Lord Sherbrooke, in an article in a recent number of the *Nineteenth Century*, sweepingly assails all attempts at regulating bankrupt distribution. He sums up past experience as having oscillated, with about equally bad results, between the two methods of treating bankruptcy as more or less a public matter and dealing with it in courts of law, and the other of making it a matter for private arrangement between the insolvent and his creditors. The bankruptcy courts, he quite truthfully says, have been a sink into which money has been continually poured, never rising again to the sight of those who poured it. The election must be made, he says, between an illusory equality which devours the oyster in expenses and presents the shell to the creditors, and the rude and imperfect justice which pays the most importunate, or perhaps the most favored creditors in full, and leaves the less diligent a little worse. "The truth is," he says, "that repayment on any considerable scale through the bankruptcy law is a patent and threadbare delusion. It is better that debts should be paid unequally than that the property should be destroyed in the effort to ascertain an equality which yields a purely, not a physical and imaginary, satisfaction to the thirsty creditor."

The experiences of creditors in this country testify to the truthfulness of these statements. But because one law has disappointed us, shall we be discomfited? Is not experience a good teacher? In the light of experience, is it not possible that a bankruptcy law can be so framed as to deal equitably between the debtor and all his creditors without its administrators consuming all there is of value in the bankrupt's estate? Under the present lack of a lawful method of dealing with bankrupts, it is the unscrupulous creditor, who is willing to sacrifice all his associate creditors, that gets the lion's share of the estate. The desideratum is to prevent the bankrupt from arranging an easy exit for himself by means of creditors prepared for the occasion, and to make sure that the really interested creditors shall govern the proceeding. If this were easily attained, it would long ago have been; yet to-day its possibility is to confess judgment, as Lord Sherbrooke does, and say that debtor and creditor would best be left to themselves. He does not go quite so far as to recommend abolishing all laws for the collection of debts, yet this should logically go with abandonment of bankruptcy laws; and, obviously, if there are to be such laws at all, they should be condensed into one uniform one. The law generally leaves seller and buyer to look out for themselves in the matter of buying for cash or of incurring indebtedness, save that fraudulent representations are made punishable lies, as contrary to public interest. This is on the theory that the matter is a private one between the parties. But bankruptcy laws must proceed upon the theory that it is not for the public

interest that debtors evade their debts or that an equality among creditors be not reached. The law steps in and takes the matter out of their hands. If this and its theory are not sound, there appears no logical reason why the law should intervene to help the collection of a debt prior to insolvency. If we are to abandon the attempt to regulate insolvency adjustment, why not go also to the extreme of abandoning all collection laws?

Under existing laws for the collection of debts, varying in every State in the Union, a person who gives credit takes his chances of collection, and his prospects of realizing on those chances are measured principally by his debtor's idea of what constitutes honor and integrity. Some men regard it as a discreditable act if they are obliged even to ask an extension of their paper, while others would regard it as a creditable and "smart" thing to do to so represent their affairs as to compel their creditors to compromise their claims for twenty cents on the dollar. In the absence of any moral standard of integrity, it is desirable for Congress to impose a legal standard, and to say to a scheming debtor, "thus far shalt thou go, and no farther." A similar restraint upon that class of creditors who would seize upon the oyster for their own deception, leaving the shells to be divided among other equally deserving creditors, is also desirable. It is to be hoped that the present agitation of the subject will result in giving us a bankruptcy law that is fair and equitable alike to the debtor and creditor classes, preventing the one from swindling and the other from arbitrary use of power.

Deceptive and Fraudulent Goods.

WE have frequently called attention to a class of fraudulent goods in the market that is well calculated to deceive not only the public, but the retail trade as well. This consists of goods made in imitation of fine goods, marked or sold as 14-karat, but that contains in reality but from 6 to 10 karats of gold. We have spoken so much of this kind of swindling of late that it might be inferred that our jewelers generally were engaged in that business. Such is not the fact, however. On the contrary, no more honorable class of business men can be found anywhere than our jewelers, manufacturers, jobbers and retailers; but, unfortunately, a few unscrupulous men have fastened themselves upon the business, and are flooding the country with spurious goods, not only swindling the public, but bringing the trade into disrepute. Their travelers go about from place to place loaded down with samples of their goods, made in imitation of the latest designs in jewelry, and do not hesitate to guarantee to the retailer that they are 14 karats fine, when, in fact, they will not assay 10 karats. Retailers are not always prepared to assay goods presented to them, but are apt to take the word of the seller as to the quality of his wares. When these fraudulent goods are imposed upon them, they are made a party to the fraud perpetrated upon the public, and are generally the greatest, if not the only sufferers, by the transaction. The traveling salesman disposes of his goods and leaves the town, but the retailer is a resident of the place, and must take the responsibility when his customers detect the fraud of which they have been made the victim.

Recently a traveler called upon a prominent Southern dealer and wanted to show his samples. He exhibited a great variety of goods, the best of which he represented to be 14-k. and the remainder 10-k., staking "the reputation of his firm upon the truth of his representations." The Southern gentleman was a reader of THE CIRCULAR, and had learned to be suspicious of strange salesmen representing houses of which he had little knowledge. Besides, he knew that gold goods could not be sold at the prices named. He therefore said if the goods were genuine he would buy, but before doing so would subject the samples to his test points. While he was looking for his points the traveler endeavored to obtain the locket selected for testing and substitute another in its place, but the dealer was watching him too closely, and persisted in testing the one that had been "guaranteed" as 14-k. Applying the test point to it, the com-

motion produced at once indicated the quality of the metal to be below 10-k., while that guaranteed at 10-k. scarcely gave any indication of the presence of gold. In fact, all the goods offered by the traveler were so debased as not to be entitled to be classified with gold goods under any consideration. Finding he was detected, the traveler "owned the corn," said that his house made this kind of goods a specialty, and sold them largely to dealers in all parts of the country; many dealers, he claimed, knew the true value of the goods, bought them for what they really were, and sold them for what they purported to be, thereby making a larger profit on them than they could on genuine goods.

No doubt he was right in this latter statement, for unquestionably there are retail dealers just as dishonest as these manufacturers, and delight quite as much in swindling the public, but they no more constitute the retail trade than a glass of water does the ocean. But these dealers who consent to handle these bogus goods, taking advantage of their positions as permanent business men in a community to deceive their customers, are swindlers of the worst character. They impose upon confiding patrons, who trust to their knowledge and integrity, goods that they know to be fraudulent, however temptingly they may be manufactured. If they pay the manufacturer full price for such goods, they themselves are swindled; but if they buy the goods for less than the known cost of the gold required to make the articles, they are thus made aware of their true character, and in selling them again to their customers place themselves on a level with the common pickpocket who robs his victim unawares. It is useless to mince matters or to be overelucidate as to phrases; a spade is a spade, and robbery is robbery, under whatever guise it may be perpetrated. These manufacturers of bogus goods have imitated almost every kind of jewelry, and their samples include nearly every variety. A favorite article with them is gold chain, the swivel of which is stamped "14-k." while the chain itself is but 10 k. gold; the unsuspecting purchaser supposes the mark to indicate the quality of the chain as well as the swivel, and pays his money in accordance with this belief. Such a fraud subjects the seller to criminal penalties for obtaining money by false representations, and we shall be glad when a few of them are sent to state prison to teach them common honesty. The Southern dealer above referred to notified the traveler whose goods he tested that he was engaged in a swindling transaction, and that if he sold any goods in that town he would prosecute him criminally. The individual took the hint, and left that locality by an early train.

It is common for the manufacturers of these bogus goods to say, in explanation of their low price, that they have their goods made by piece work; that they do not have the expenses of a large factory to meet; that their workmen are foreigners, who are content with small wages, etc. This is partly true and partly false; these manufacturers rely upon the debased quality of their goods for their profit, but in order to increase this profit, they squeeze their workmen down to the lowest possible wages. Much of it is made on the tenement house plan by needy and generally dishonest immigrants, who consent to work for low wages with a full consciousness of their ability to steal enough gold from their employers to make up the difference. By this means the goods are twice robbed; first, by the manufacturer who debases the quality below the standard represented, and, second, by the tenement house workman, who adds more base metal to supply the place of the gold he steals to make up the deficiency in his wages. It is a sort of diamond cut diamond business, but is a game of which neither can complain without exposing himself. This disreputable business has become saddled upon the trade, and presents a serious obstacle for honest dealers to overcome. Of course they cannot sell genuine gold goods at the prices asked for the bogus stuff, and so long as dealers consent to be made the tools of scheming villains and to share the infamy of swindling the public with bogus goods, honest manufacturers and dealers will have a hard struggle to make both ends meet. But some retailers say, "We do not know these goods to be bogus, and they are guaranteed to us as

genuine." If they are genuine gold goods, you know that they cannot be sold for the price asked, and must have been stolen, therefore in buying them you do so with a moral certainty that they are not honest goods. Besides, if a dealer cannot tell the difference at sight between 10-k and 14-k goods, he had better seek some other business where intelligence is not a prerequisite. In ninety-nine cases in a hundred where a retail dealer sells bogus goods for genuine, he does so with a full knowledge of their true character, and is as much a swindler as the man who makes them.

We have repeatedly pointed out the remedy for these evils, viz., the enactment by Congress of laws fixing a standard of quality for wrought gold and silver goods, and providing severe penalties for any one selling goods below the standard they are represented to be. But Congress will not enact such a law unless requested to do so, and surely the dishonest manufacturers are not going to ask for a law that will kill their business. We have in the country various State associations of retail dealers, organized for the ostensible purpose of protecting the trade from abuses. Their objective point thus far has been to prevent jobbers sending out catalogues and price lists to persons outside the trade. That this was an evil was admitted, inflicting serious injury upon retail dealers, but it was nothing in comparison to this great swindling operation of which we are speaking. The catalogue and price list abuse has been brought to an end by the action of these associations, and it is now high time they turned their attention to the graver abuses in the trade, to which many of them are *particeps criminis*. If they were organized for the sole purpose of fighting the few jobbers who sent out price lists to persons outside the trade, then it is a pity they were called into existence; if, however, their object is to combat all the evils that afflict the trade, then it is high time they set to work to drive out of an honorable calling those unscrupulous manufacturers of bogus goods and the retail dealers who aid them in disposing of them. Compared to this evil, the price list abuse is as a mole hill to a mountain. The National Guild, which is supposed to represent these State associations, has already pronounced in favor of a national standard of value; let it now take upon itself the task of inducing all the State associations and the prominent jewelers in every section to unite in petitions to Congress to pass the necessary laws to protect the trade and the public from the nefarious practices of evil disposed men. We hailed the birth of these associations with delight, for we saw in them a power for good under proper management; but, aside from their fight with a few jobbers on the price list question, we fail to see where they have accomplished much good. As individuals the members are constantly complaining of abuses in the trade, but in their associated capacity they fail to grapple with these abuses or to seek a remedy for them. That remedy lies in the application of the law to swindlers and thieves, and these associations can cause such application to be made at once if they choose. The criminal law in every State is sufficient now to punish misrepresentation and fraud; but to make it more certain, Congress should be asked for further legislation to regulate the standard of value for gold goods. By turning their attention to these subjects, these various State associations will give proof of the wisdom of those who called them into existence, and of the right of the organizations to be recognized as a power for good within the trade.

Teaching the Art of Horology.

WE print in other columns an interesting account of the addresses made at the distribution of prizes of the Syndicate of Horology, of Paris, to the young men who had been learning the art of watchmaking under its auspices. The speakers set forth that this school was established because of the lack of facilities in France for young men to learn the art, under existing methods of watchmaking, where machinery has usurped the place of hand labor to such an extent as to destroy the old system of apprenticeship. Reasons are set forth explaining fully the decadence of that system which made

scientific workmen, and explaining why it is impossible that, in the future, young men should be able to make themselves efficient workmen in the shops of to-day. In honor, therefore, that the race of practical horologists might not become extinct, some philanthropic gentlemen identified with the science, established the school of horology wherein young men are thoroughly taught, not only the science, but its mechanical application. The school has been a pronounced success thus far, and has enlisted the sympathy and co-operation of the public to a great extent. The exercises attendant upon the distribution of the prizes awarded to superior merit, were witnessed by a multitude of persons, and the remarks of the various speakers, describing what the school was doing for the elevation of the working class, were enthusiastically applauded. The proceedings which we print are not only interesting, but furnish food for thought.

All the conditions, as there described, tending to prevent young men from learning the trade of watchmaking, exist in this country to even a greater extent than they do in France. There are very few shops where it would be possible for a boy to learn the art of watchmaking in all its branches, or where an employer would find it profitable to teach him. So much of the work is now done by machinery that it is cheaper to buy most of the parts of a watch than to attempt to make them by hand, and an apprentice would have a hard time in learning anything regarding them. In the great factories they do not teach watchmaking; young persons are instructed in the use of machinery and tools for making certain parts of a watch, and may spend their lives making those particular parts, and no others, without comprehending the relation such part bears to the completed watch. Such persons are merely manipulators of machinery; they work in watch factories, but are as far from being watchmakers as is the blacksmith who forges some of the heavier tools employed. But the main reason why the apprentice system has fallen into decay in this country is because it was unprofitable to the employer. If he took an apprentice he was bound to teach him the trade entire, giving time, labor, and material to such instruction; but, instead, he can, if he chooses, employ boys to work at specialties, and nothing else, year in and year out, for about what he would have to pay an apprentice. These boys soon become expert in doing certain things, and therein the employer finds his profit. So rarely are apprentices to be found that it is within the bounds to say there are none, nor can there be under our present system of watchmaking. What, then, is to be done in the future? Where are our thoroughly practical watchmakers to come from? There will always be plenty who can take a watch down and put it up again, and, possibly, remedy defects, but where shall we find the men who know the principles, theoretical and mechanical, of watchmaking, and who can make a watch complete in all its parts? The number who can do this, and are entitled to be called watchmakers, is growing smaller each year.

Something must be done to fill the ranks of practical watchmakers, and we see no way to accomplish the desired end but by establishing schools of horology, as has been done in France, Switzerland and Germany. In Germany and Switzerland there are several in successful operation, and their influence upon the business is widely felt. Many young men have been thoroughly taught the art of watchmaking, including the making of the necessary tools with which to do the work. Their education has been scientific as well as mechanical, professors of both branches of the art being employed to instruct them. Their intelligence is developed at the same time their mechanical dexterity is properly trained. As a consequence, the pupils graduate as thoroughly competent watchmakers, without having had to go through the drudgery of an apprenticeship, including its disagreeable features of "chore" boy and general factotum for a shop full of men. Such an establishment would cost but little in this country. The principal expense would be for instructors, the few tools required involving but a small outlay. We do not doubt but such a school would be self-sustaining in three years' time, for let it be once known that, for a modest tuition fee, young men would be thoroughly taught the art of watchmaking, and the applications for admis-

sion would soon be numerous. Indeed, we firmly believe that such a school would pay as a private enterprise. The success of the mechanical schools of the Cooper Institute, where every class room is overcrowded with youths desirous of obtaining practical knowledge, whereby they can earn their livelihood, is evidence that the young men of the country are ambitious to apply themselves to industrial pursuits, but lack the opportunity of so doing that should be afforded in the shops and factories. From a variety of reasons, it has become almost impossible for young men to learn a trade; trades unions, that were largely instrumental in destroying the apprenticeship system, have closed the doors of our factories and shops in the face of ambitious youth, and they are prohibited from learning trades. This accounts for the great number of botch watchmakers to be found everywhere, and for the growing scarcity of good workmen. It would be a grand thing if the various organizations of watchmakers and jewelers would combine to endow a school of horology, and make it thoroughly national, inviting young men of intelligence and ambition to come forward and perfect themselves in the horological art. We know of no individual in the trade who is likely to do so philanthropic a thing, and if we ever do have a horological school it must be the result of combined effort. It is time the enterprise was put in shape. We are falling behind our foreign competitors in this respect, and if we do not soon set about instructing young men, we will have to draw on the schools of Europe for our practical workmen.

Mutilated Coin.

THE nuisance of punched pocket pieces is probably doomed. When silver rose out of sight, during war times, a gold or silver coin was hoarded as a curiosity or souvenir. Rural beaux gave them to the belles for keepsakes. To punch a hole through one so that it might be hung by a ribbon around the neck was very natural; to string a dozen or twenty in a bracelet or necklace by means of the same device of a little hole in the edge, was not uncommon. Rogues soon saw in this practice temptation and opportunity to swindle, which has become very extensive. For, when coin returned to circulation, and the special interest attached to preserving specimens declined, many persons broke up their ornaments, made by stringing together dimes or dollars, and used the pieces, notwithstanding the little holes, for money. And then under cover of the fact that a small number of punched pieces thus came into circulation somewhat legitimately, the swindlers adopted a practice of punching as large a piece as they dared out of every coin they could lay hands on; the mutilated coin was then put in circulation, while the pieces were kept till enough were gathered to warrant melting them and selling as metal. The good-natured tolerance of the people has allowed this nuisance to run too long. Two or three years ago the post offices began to refuse the punched pieces. Banks and establishments somewhat independent of popular custom have done the same. Keepers of small shops, restaurants, grocers, saloons and cigar stores, news stands and the like have felt obliged to receive them, lest, by refusal, they should lose custom. Many of these have naturally felt justified in proffering to customers whatever coins customers gave to them; some have been magnanimous enough to sell their mutilated coins as such, and bear the loss.

Apparently the class of persons responsible for the swindle have lately been giving it a new turn; for an anonymous placard, headed, "Notice to Customers," has made its appearance extensively. It reads:

The United States Government has fixed the following values on silver coins with holes in them:

Dollars.....	65 cents
Half-dollars.....	35 cents
Quarter-dollars.....	15 cents
Dimes.....	5 cents
Fives.....	4 cents

These values are placed upon coins so punched with a view to calling in and stopping the unlawful practice of "mutilating" silver money of the United States.

We understand that this announcement is repudiated by Treasury officials in this city and in Washington. It can hardly be authentic, for it would oblige the Government to receive coin notwithstanding it might have been mutilated more than the designated sum; a quarter-dollar might be cut in two, and fifteen cents demanded for each half. The only just and sensible way of valuing coin which has been clipped or punched must be by weighing it. Apparently the notice is a new cheat of the swindlers, designed to open the way for them to go through the city buying up mutilated coins at rates perhaps a little higher than that allowed by the notice, they knowing that they can get a much higher price by weight.

But a bogus notice may be effective in driving these coins out of use. The matter of making change depends very much on common usage of the people. No one likes to refuse what people generally accept. In many positions one cannot well refuse it. Whoever is obliged, as all constantly are, to offer a bill in payment for something bought, expecting change as matter of usage, is in a measure obliged to take such coin as usage sanctions. This disowned notice may be useful in changing the usage under which the depreciated coin has been circulated. Already the ticket-sellers and the news dealers at the elevated railroad stations are, we believe, instructed to refuse these coins uniformly and systematically, and will, of course, discontinue paying them out. Wherever the notice is posted it will serve to show that these coins had better not be offered to that dealer, and will make him ashamed of offering them to customers. A few days of general dissemination of such a placard will open the way—nay, probably has already opened the way—for the entire public to say, when one of these coins is offered: "I don't take that kind of money any more; it is no longer usual change." By all means pass the fictitious placard around till mutilated coin is known no more. Meantime the public will do well to be on their guard against pieces in which the hole has been ingeniously filled with some base metal.

Bogus Lists of Jewelers.

A FIRM in New York have been offering to the wholesale trade what they claim is a correct list of the jewelers of the country. This list consists of the name and address of individuals in nearly every town in the country, printed on gummed paper, easily detachable and used on circulars, etc. We have received several complaints regarding these so-called lists of jewelers, there being comparatively few of the persons whose names are given engaged in the jewelry business. One wholesale dealer, who found names in the list that he did not recognize, took pains to investigate by sending to his customers the names of the persons given as jewelers in the places where such customers live. As a result, he found that many persons whose names were in the list were not in the business at all, but among them were milliners, blacksmiths, bankers and even undertakers, while for others the undertaker had already performed the last sad rites accorded to humanity. Another correspondent writes that of the three firms given as doing business in his place, one never had any existence at all, and another carries on the drug business. Equally flagrant mistakes are reported to us from other sources, so that we are convinced that these printed addresses are entirely untrustworthy, many of the alleged jewelers having no existence save in the fertile imagination of the individual who prepared them. In short, we know of our own personal knowledge that there is no complete list of the legitimate jewelers of the country, who number many thousands, in existence. We have spent much time and many hundreds of dollars in preparing such a list, and have more addresses of jewelers than any one else connected with the trade, but still do not regard our list as sufficiently accurate as yet to give to the trade. We hope to do so at an early day, however. But an inaccurate list is worse than an incomplete one, for when dry goods men, druggists, undertakers and other outsiders are included in it, wholesale dealers may be induced to send them price lists and catalogues. Indeed, we are confident that the use of these printed lists have already contributed much to this evil. Jobbers have bought them with the assurance that the names had been gathered from authentic sources and the list entirely trustworthy. Accepting these assurances, they have sent out their circulars, catalogues and price lists with confidence that they were only going to regular dealers, whereas many were thus addressed to outside parties.

Seventh Annual Dinner of the Jewelers' Association.

The seventh annual dinner of the Jewelers' Association was given at Delmonico's on the evening of October 20. There were one hundred and twelve members and guests present, the former including the representative men in the trade, while among the guests were gentlemen distinguished in the pulpit, in the judiciary, at the bar, and in literary pursuits. The elegant reception and dining rooms were beautifully decorated, the tables adorned in an artistic and sumptuous manner, with floral and silver decorations, while floods of light shed from numerous chandeliers and candelabras lent brilliancy to a fairy-like scene. The dining hall was newly decorated, the walls and ceiling displaying a wealth of gold and silver ornamentation. At seven o'clock the company was escorted to their respective seats, each one of which was designated by an artistic card bearing the name of the individual who was to occupy it. All the arrangements for the banquet were exceedingly happy and appropriate, reflecting great credit upon the committee of arrangements, which consisted of Messrs. Chatellier and Dominick. The dinner was served in Delmonico's best style, all the delicacies of the season being presented in forms to tempt the appetite and please the eye. Choice wines and fragrant cigars were included in the bill of fare, and while these were being enjoyed by members and guests, the speakers of the evening were regaling them with charming addresses, replete with wisdom and wit. The choice of speakers was most felicitous, the remarks of each being happy and appropriate to the occasion. The banquet was served at 7 o'clock, and the exercises were brought to a close at 12 o'clock, when the company regretfully separated. In all its aspects, the seventh annual dinner was a most notable event, bringing together, as it did, a goodly number of the representative men of the trade of this and other cities, and affording them an opportunity for social enjoyment. Such re-unions are doing much to soften the asperities of active business competition, and, by giving competitors a more perfect knowledge of each other, leading all to entertain a higher opinion of those who have heretofore been regarded only as business rivals. We regret that the banquet occurred so late in the month that the necessity which compels us to go to press early, prevents a more specific reference to the leading features of the re-union. We present herewith a detailed report of the proceedings, which, we are sure, will be read with interest by everyone connected with the trade.

THE BANQUET.

The guests being seated in the elegant dining room, dinner was served without delay. The following was the menu.

MENU.			
HOUTES		FOTAGES	
Consommé d'Orléans	Horis d'œuvres	Crème d'asperges	
Varies	Timbales, Perigourdine	Varies	
RELIEVES			
Saumon, Hollandaise vert pré	Selle de chevreuil vin d'Oporto		
ENTREES			
Suprêmes de volaille purée d'artichauts			
Mignons de filet de bœuf aux champignons			
Squabs au risotto			
SOCIÉTÉ			
Montmorency			
Rotis			
Redheads & Pondeaux			
Salade			
ENTRETIENS			
Haricots verts	Petits pois		
SOCIÉTÉ			
Croute aux ananas à l'Impériale			
Geleée aux fruits	Crème, Colbert		
Coupoles, Chantilly	Gâteau de Venise		
NAPOLITAINE			
Gâteaux vaies	Bombe, Japonaise		
	Petits fours		
FRUITS & DESSERT			
	Café		

20 Octobre, 1881.

Delmonico.

The following is a complete list of the guests and members of the Association present:

ASSOCIATION GUESTS.

Rev. John Hall, D. D.; Rev. James M. King, D. D.; Hon. Carl Schurz; Hon. Isaac H. Bailey; Hon. Chauncey M. Depew; Hon. Stewart L. Woodford; Hon. Algeron S. Sullivan; Hon. George B. Satterlee; Judge John R. Brady; President Franklin Carter; of Williams College; D. H. Hopkinson; Col. Clifford Thomson.

MEMBERS OF THE ASSOCIATION.

Ethel C. Hine, President; Wm. R. Alling, Vice President; Thos. G. Brown, Treasurer; Joseph F. Chatellier, Geo. C. Taylor, D. F. Appleton, E. C. Fitch, S. W. Hale, L. J. Mulford, R. N. Peterson, F. S. Douglas, H. B. Dominick, L. B. Haff, A. Carter, Jr., A. K. Sloan, C. E. Hastings, H. B. Smith, J. W.

Miller, I. M. Miller, Wm. S. Hedges, M. Bailey, Treasurer Newbury Clock Co.; Chas. Magnus, of P. Bissinger & Co.; F. E. Morgan, of New Haven Clock Co.; J. G. Bacon, of Meriden Britannia Co.; L. L. Woolley, of Elgin National Watch Co.; Chas. G. Lewis, representing Rand, Barenmore & Billings; E. Holbrook and W. G. Spencer, of the Gorham Mfg. Co.; J. A. Allen, and H. A. Langer, of J. Maguire, John A. Riley, D. F. Conover, Samuel Dodd and C. E. Breckenridge, of Wilcox Silver Plate Co.; S. E. Thomas, and H. Olmstead, Secretary.

GUESTS OF MEMBERS PRESENT.

John G. Rollins and H. S. Ward, of London, England; Dr. Stuart Eldridge, of Yokohama, Japan; R. H. Galbraith and E. E. Isbell, of Cincinnati; J. T. Bailey, Glen Wexley and E. Kattermus, of Philadelphia; J. Lewis and McRae, of San Francisco, Cal.; Boyd Park, of Salt Lake City; Benj. Shreve, W. P. Shreve and F. B. Todd, of Boston; F. E. Morse, of Chicago; David Dodd, of Orange, and C. C. Dodd, Jr., of Louisville; J. H. Loring, of New York; D. H. Butler, of Hartford, Conn.; H. Hennegan, of Baltimore; James Allan and Wm. Thomas, of Charleston, S. C.; Chas. E. Galt, of Washington, D. C.; A. T. Hubbard, of Cleveland, Ohio; Henry Tilden, of Providence, R. I.; O. E. Zatek, Mobile, Ala., and the following of New York City: Chas. L. Tiffan, H. S. Cozens, S. Cottle, Leroy W. Fairchild, Fred. B. Jennings, Arthur O. Jennings, Fleming Smith, Herman Schaus, Robt. C. Black, Gilbert T. Woglom, A. O. Headley, J. W. Miles, J. P. Howard, David W. Granbery, R. W. Beyrich, G. H. Gale, W. H. Vogel, Morton Smith, H. S. Noyes, A. Chamberlain, Jr., John S. Billard, S. B. Barr, J. Kuhlman, A. B. Bray.

When the viands had been fully discussed, President Hine addressed the assembly as follows:

ADDRESS OF PRESIDENT HINE.

Gentlemen and fellow members of the New York Jewelers' Association:

By your kind hospitality, which I gratefully acknowledge, I am enabled for the second time to congratulate you upon the occasion of our annual banquet, the seventh of a pleasant, brilliant and memorable series, and in your name and behalf, to bid a cordial welcome to these guests who are so soon to charm and delight us with their instructive and eloquent discourses. We are accustomed on these occasions to congratulate ourselves upon what success and prosperity is already assured to us, to draw from the experience of the past lessons for the future, to weigh the present as it surrounds us, and gain inspiration and hope and courage from the future as we are enabled to forecast it. As business men we stand always in the presence of an inspiring past. The growth of the American watch trade is in itself an oration upon progress. The growth of the trade in Yankee clocks is a complete missionary sermon, for they have gone where the missionary has gone, and somewhere with the influence of their culture and refinement. You do well to have been passing in our time, for I suppose your best customers, the American women, were never so swiftly and so grandly educated as in the recent past, and it is well-nigh certain that art and skill in our craft must derive an elevation from the noble example, the white purity of character, the sublime faith and heroic courage of Lucretia Garfield.

But half the night would not suffice me to enumerate the thoughts which crowd around the heart and pertain to the occasion. It illustrates the cruel disappointments of high official position, that I have prepared with great labor and painstaking care an address proper for this occasion, showing vast wealth of research, large philosophy of experience, and all that sort of thing, and now I am sharply admonished by the lateness of the hour, and by these speakers on my right and left, who only need to be cultivated with a toast, to burst into speech and blossom into eloquence, that I must be brief. I shall heed the admonition. During the late war one of our distinguished generals gave this order, "Go in and fight your man the best you can." Gentlemen, we shall go promptly into action, and never was a commander more ably supported; and it happens to-night, as it often has happened before, the better men are in the ranks. I predict a great victory.

President Hine then announced the names of invited guests who had not been able to attend, as follows:

Mayor Grace, Hon. W. M. Evans, Judge Noah Davis, Rev. Dr. Metcalf, Rev. Dr. Thomas, Rev. Dr. Storey, John E. Parson, Hon. John Hay, Rev. Dr. Collyer, and Hon. U. S. Grant.

A letter of regret was also read from James Appleton, an old and respected member of the jewelry trade, who long ago retired from active business, but whose memory is kept fresh and green by all who knew him. The following telegram was also received from the Chicago Jewelers' Association:

CHICAGO, Oct. 20, 1881.

President N. Y. Jewelers' Association, care Delmonico.

The Chicago Jewelers' Association bids me to tender you our kindly greetings, and regrets that we cannot be represented at your social board this evening.

HERMAN F. HAHN, President.

PRESIDENT HINE—Gentlemen, we have scarcely emerged from under the shadow of a great affliction which smote every heart and every home in the land with the crushing force of a personal bereavement. Remembering this, I ask you to fill your glasses and drink in silence, standing, to the memory of our late lamented President, JAMES A. GARFIELD.

The toast to the dead President having been drunk, Mr. Hine continued: I give you the next regular toast and ask you to fill a bumper for this, as there will be no response.

"The President of the United States, CHESTER A. ARTHUR."

[This was responded to by three cheers and a tiger from all parts of the room.]

PRESIDENT HINE—I will give you the second regular toast of the evening:

"New York: the Empire State and Metropolitan City."

I have the pleasure to call upon one of New York's distinguished citizens,

born, I believe, in New England, but transported, [laughter, Mr. Hine correcting himself.] transplanted here early in life. Certainly he is always welcome at our banquet. I will introduce to you Hon. Isaac H. Bailey.

REMARKS OF HON. ISAAC H. BAILEY.

Mr. President and Gentlemen of the New York Jewelers' Association:

I am more embarrassed than I ever have been before on these occasions. Not by the lack of something to say, but by fear that every moment that I occupy will be begrudged by the gentlemen assembled here. I have been hurried at by gentlemen on either side, and especially my friend upon my right [Mr. Depew] has intimated to me that the toast of "New York" is his by right. You have all of you heard that speech of Mr. Depew's when he delivered, for twenty years or more on all occasions, "I could repeat it to you from memory."

If I were to speak of the City of New York in a strain fit for this assembly, I should tell you of its imperial resources, its magnificent power, its glorious Central Railroad [I thrust Mr. Depew's hand out of the way.] this dangerous city gentleman, speaking as a New Englander, to be obliged to say here that in reference to the metropolitan city there are some little defects to speak of. This, if I were certain that only my countrymen could take notice of, I should not hesitate to say, for the purity of my party requires it to speak of New York with a feeling of criticism. For we do know that there are certain municipal difficulties attending the great population which have somewhat impaired our pride in the city of New York. I suppose most of you have at some time or other passed through the City Hall Park, and if your attention has been called to a small building upon the north side of the park, you have probably called to mind that that building cost the city twenty-three million dollars. It would have been better for the city if it had never built it, but had wasted the money in buying jewelry. The water supply of New York has also been impaired through it, would seem, questionable means. Do you know why, gentlemen, at this particular time the Department of Public Works sends forth a feeling notice to the public not to be careless of the water? Can you not guess why? Because it has all been put into the Metropolitan Railway, who have used it up in watering their stock. But, after all, the city of New York, looking over these little defects, is a magnificent city. We are not to regard it as doomed; hopelessly because it has been given over to foreign government. It is a great misfortune, certainly, that we native citizens have so little to do with it. They should be glad that something has been or is being done by those immigrants who have come from the countries near by in relieving citizens from their troubles in this respect. But, gentlemen, I say after all we may speak about it, our city has not the worst government in the world, and is able to hold its own. We are undoubtedly as good people as there are upon the face of the earth, and when you hear people talking about corruption in foreign lands we feel that we don't know anything about it compared with other countries. There is less corruption in this country than in any other country on the face of the globe.

I do not wish to continue this subject any longer, I have a self-interest in making one little hint for an invitation to an affair which I understand is coming off in a short time [at this point Mr. A. K. Sloan was observed to flash to the very roots of his hair, and to be searching under the table for a handkerchief which he had not brought, and which, according to society papers, is to be an event of great importance, and one which, in all probability, is about to develop the greatest amount of art in your profession not to be compared with anything that has ever happened in the jewelry trade.] I have been told that the Jewelers' Association is to be limited in the bonds of matrimony in a short time to a lady of a very eminent name, at least—I understand the descendant of the celebrated Protector of England, and that that event is likely to bring forward the greatest profession of magicians and fortune tellers in the world, and has ever been seen in this country. I can only say that I have made successful effort to be introduced to the gentleman, and that I shall be very happy to see him later, to give him my address.

PRESIDENT HINE—I give you the third regular toast of the evening:

"The Old World and the New: the Fraternity of nations, as cemented and strengthened by the unity of commercial interests."

I have the honor to present to you Hon. Carl Schurz, who will respond to this toast. [Hearty Applause greeted Mr. Schurz as he arose to speak.]

REMARKS OF HON. CARL SCHURZ.

Mr. Chairman and Gentlemen:

The great kindness with which you have received me, warrants me in believing that I shall be treated with the highest consideration by those who are here after dinner, being called upon to respond to a toast, say of the sentiment which they have to respond to, as little as they please. I shall, however, not avail myself of that privilege to its full extent. The fraternity of nations, as cemented and strengthened by their unity of commercial interests, in my humble opinion, is in the endeavor of each nation to make as much money as possible out of every other nation. And this is accompanied by the other desire that itself, be as prosperous as possible in order to be able to buy as much as possible. But inasmuch as all such relations must be reciprocal—if you want to sell much to other nations, you will have to buy of them, and you do it for this reason. This may sound rather as an unsentimental, cold-blooded view, yet there is a great deal of humanity in it, for there rests the gain of the only right thing that one nation has to say, has want others to do unto you; that your prosperity and progress rests with the prosperity and progress of other nations. That, after all, is the true basis of lasting peace and good will. If I could say that I have had the privilege of seeing this country of ours is not very old, but it has passed that state of development in which the principal working of the people is the clearing away of primeval forests, of cultivation of the soil, and of the settlements—providing for the necessities of the life. In the course of time we have been abundantly blessed by good fortune. We have had longer periods of peace than any other nation can boast of. As a direct consequence, our people have more than their share of quick wit, of enterprise and go-ahead

spirit, and thus we have become rich as a nation. We are wealthy, and play with a great national debt as if it were a small matter, much to the envy and admiration of other nations of the globe. When a nation has acquired this position, its desires go beyond the necessary and extend to what is pleasant and enjoyable. Then comes the time when industries of the more useful kind blossom out and produce the beautiful. Then, gentlemen, you step upon the scene, and it is your business to add to the useful industries of the nation, by the way of giving it your business to cultivate taste. That problem you have solved most magnificently, and it has been achieved solely by enterprise and energy too. You, the jewelers and the manufacturers of the more useful articles, have given the nation the credit of Congress pleading the lobby act to be supported and protected. You have relied upon your own enterprise and your own ingenuity. To be sure, the goods that you manufacture bear a duty, but it is of the lowest kind in our system, and you might just as well have gotten along without it. You have given the nation the credit of having that any legislature in the world can afford to give. It is in this way that you watchmakers and your clockmakers have beaten Switzerland in her own field, it is the gold and silversmiths who are rivaling in this manner the great productions of Paris. There are many who underestimate the value of art industry in its relation to the production of wealth in a country. It is, gentlemen, by political economists assumed that the value of a thing consists in its cost of production, then the market value is added. Now take a chunk of silver, say a dollar's worth, and put it in the hands of one of your skilled workmen, and in a short time he turns you out an elaborate clock case. That clock case may be worth three hundred dollars or more. In that instance the cost of production has almost an infinitesimal price. It is the element of beauty and genius giving to that article such which imparts to its value; it is, in other words, art industry in its true sense that gives it that value. Look, for instance, at France as an evidence of this. France is such a country that it is impossible to see it without being struck by the artistic nature of its development, its taste, which inspires all the productions of industry, and gives them a value over the ordinary profit of industry.

I have heard some members of this Association say that it is their desire to develop it into something like the goldsmiths in London. I think that is a noble ambition. It is true some of those old lively companies have gradually drifted from their original purpose, but still sometimes they elevate themselves up to do very useful things. Some days since I happened to read a story of the artistic training of the ivory companies of England, upon the practicality of founding and enlarging technical schools for thorough education of workmen in the industrial pursuits—for the education of the character of industry and of the quality of its products. If I may venture upon a suggestion, there is something for you to look to—an example which might be worthy of imitation, although the art industry in this country is already developed, it is capable of far greater development. If an example could be found, it would be of immense advantage to you. A school of art industry, where your young men are thoroughly instructed in drawing, in designing, in the theory and practice of decoration, so as to gradually have their eyes opened to the true nature of beauty—it is to be desired that the artistic mind that can be brought or copied from the master workmanship of other countries, is something, in my humble opinion, worthy of consideration. It would seem to me, that your manufacturers and your jewellers, who are everywhere which deceives every body but the artistic bargainer; although your watch and clock makers are not goods that not only keep time, but may with good taste be placed on our mantelpieces, as articles of ornament; although your goldsmiths are already defying the world as large and beautiful workmanlike artists, and are not only able to make articles, and you might, in establishing such institutions, not only do a very useful thing directly for your own interests, but also something worthy of imitation by a gentleman of the same standing and position, and begging pardon for the presumptuousness with which I have offered this suggestion, I will now close by expressing this sentiment of my own: The art industries of America, the enterprise which started them, the genius which develops them, and the progress in civilization which supports them. [Applause.]

PRESIDENT HINE—I give you the fourth regular toast.

"Our Government: The prosperity and stability of every form of government is dependent upon the intelligence, integrity, energy and enterprise of its commercial men."

I have the pleasure to introduce the Hon. Stewart L. Woodford.

REMARKS OF HON. STEWART L. WOODFORD.

Mr. President and Gentlemen:

Great would be the privilege of being with you, and warmed by the indirect heat communicated to my friend Mr. Bailey. I shall be very brief. Without being hypercritical as to the terms of this toast, I would rather it had been enlarged—that the prosperity and stability of every form of government depend upon the intelligence, the integrity, the energy, and the enterprise, and the honesty of the people, and the good sense of all its citizens. You commercial men have a larger opportunity than any other class, and therefore you have a larger responsibility. With the railways, and the more intimate commercial relations, the whole world is being gradually brought together; so that the entire United States is closer together to-day than the State of Virginia was when the original constitution was formed; so that Asia and Europe and the United States are actually being brought within twenty-four hours of each other. So with every State and every opportunity, if [with the spirit of business] virtue, energy and enterprise go hand in hand, there must be a future development, not merely to the business, but to the virtuousness of the people, and the civilization of the people. The government has been based on the development of a single class; and, in the future, the government in its turn has failed. The merchants of Venice trod down the common people, and became nobles after a style. In old Rome it was a disgrace for a member of the Senatorial class to engage in trade. So that the entire United States has been a ruling class, and the success of the nation has depended upon the success of that ruling class to the form of government committed to it. In this country every class is equal in the sense that they have no one class, be it merchant, farmer, mechanic, or depend on. When the day of the future comes, the success of our institutions will be based on one class of persons, that day will mark the downfall of the American Republic.

Great would be the privilege of being with you, and warmed by the indirect heat communicated to my friend Mr. Bailey. I shall be very brief. Without being hypercritical as to the terms of this toast, I would rather it had been enlarged—that the prosperity and stability of every form of government depend upon the intelligence, the integrity, the energy, and the enterprise, and the honesty of the people, and the good sense of all its citizens. You commercial men have a larger opportunity than any other class, and therefore you have a larger responsibility. With the railways, and the more intimate commercial relations, the whole world is being gradually brought together; so that the entire United States is closer together to-day than the State of Virginia was when the original constitution was formed; so that Asia and Europe and the United States are actually being brought within twenty-four hours of each other. So with every State and every opportunity, if [with the spirit of business] virtue, energy and enterprise go hand in hand, there must be a future development, not merely to the business, but to the virtuousness of the people, and the civilization of the people. The government has been based on the development of a single class; and, in the future, the government in its turn has failed. The merchants of Venice trod down the common people, and became nobles after a style. In old Rome it was a disgrace for a member of the Senatorial class to engage in trade. So that the entire United States has been a ruling class, and the success of the nation has depended upon the success of that ruling class to the form of government committed to it. In this country every class is equal in the sense that they have no one class, be it merchant, farmer, mechanic, or depend on. When the day of the future comes, the success of our institutions will be based on one class of persons, that day will mark the downfall of the American Republic.

ing a sentiment, I shall find justification in the selection of the speaker, not for any peculiar conditions of merit of our beloved college, not because of any relations that I may bear in the cause of education, but to the simple fact that by an accident in the government of human affairs, I happen now to preside over that institution which gave to the world him who has been alluded to so eloquently by your President. I need not say that the sorrow that fell on the land was a sorrow that fell on his alma mater, and that the first weeks of my administration have received a baptism which I hope never to forget. That the colleges should be represented on an occasion like this is doubtless owing to a consideration of the part of your committee that institutions of this sort are of some concern to jewelers—whether like Williams or Amherst standing on their crowning eminences, or whether like Yale or Harvard on the shores of their grand commonwealths. I cannot help feeling that the astrophysics of college life are a part and parcel of our most sacred inheritance. This is not a place of time to make any distinction between the various colleges, and I would say that there having been an inclination to divide them into so-called fresh water colleges by some persons, as I have had the fortune to be connected with both, I can say that there is no ground for any such distinction. Though it was the graduate of a salt-water college that first conceived the idea by which the various parts of the continent were united one by one by means of the telegraph, it was the adopted son of a fresh-water college to flash the electric spark under the rhythmic rury of the ocean and unite the whole world into one great family, so that all the people watch the statesmanship of a Gladstone sympathize with suffering Ireland, or bend with hated breath over the bedside of a dying President. Nor is there any ground for a distinction in the equipment and splendor of the buildings of all these colleges, for it has been by the intellectual growth of the men that govern these institutions that the impression has been made upon the characteristics of the Age of our Peabody, not by any of the external qualities, but by that quickening life that passes from the teacher to the scholar has it been the ambition of the American college to elevate the American business life. It is in accordance with that same idea that Garfield once said, speaking of Dr. Mark Hopkins, who is the prince of teachers: "Give me Mark, with a piece of birch bark, and a log cabin in Ohio, and I will defy all the universities of the world."

But there has been a new departure in American colleges of late. You have heard perhaps of the nine daughters of Jupiter called muses, but have you heard of the nine sons of Mars that in every college would like to meet, on some field, nine others, and by base hits and foul catches cover their alma mater with glory. You may not know that the intersection of bases and the mastery of curves is not merely an indoor labor, but an outdoor pastime of our modern college geometers. Hercules, the man who carried the bul, is the model of most young men now, and Mercury, who took things on the fly, is also followed. If we only had a professor of base ball there might be a more equal distribution of brain and muscle throughout the colleges of to-day. I remember when I was at Chicago, not long ago, that the pitcher of the Yale nine, flushed with glory by a victory over Harvard, met me one day and asked me how many students had been examined and wished to know how many of this number seemed likely to turn out good candidates for a base-ball nine. I told him that if base ball was an object of graduation, if Chicago failed to furnish at least two men that were suitable in a nine, we should reject the entire number of applicants.

But I am glad to see that the dominion of Christian culture and Christian character is still eminent. I wish every young man who enters one of our colleges would embrace Christianity. I would think that the greatest work like those who grow not alone in power and knowledge, but from hour to hour in wisdom and charity. I cannot but believe that however constantly learning and science may be replenished, that the thread of the story must be interwoven that the perfection of character may be evolved in the American scholar. I come to you as a comparative stranger. I thank you for the courtesy with which you have listened to me, and I wish for you all that brilliant success in future gatherings which has certainly marked this gathering thus far.

PRESIDENT HINE.—You will pardon me if I mention an instance showing how our colleges have presented themselves of late to foreign countries. The story is current in Japan, and has been going the rounds of the press recently, that a Japanese student, writing home, said that there were two rowing crews in this country: one was called Yale and the other Harvard, and on rainy days they read books. I will give you the next regular toast. "*The Press wedded to Electricity, marks an era in the progress of civilization.*"

I have great pleasure in introducing, to respond to this toast, Colonel Clifford Thomson.

Mr. Thomson's response to the toast was in rhyme, and was a tribute to the press and to the trade. We have space for the following extracts only:

You call the Press. It is a mighty theme—
Mighty as even St. John's Patmos dream—
The mightiest power that dominates the land;
That gives to lords and Emperors command;
That checks the arrogance of tyrant king;
That light and justice to the humblest bring;
That back the cloven hoofed monster can roll,
Illuminate the mind, emancipate the soul;
That shakes the throne of bigotry and gives
Freedom of thought to every soul that lives.
The Press! When old Ben Franklin slowly wrought
Ten quires an hour of sensational thought
On dingy, hand-breadth sheets, he little knew
Of what the Future meant from his view.
He little dreamed that his ten quires an hour,
Caught up to-day by Steam's tremendous power,
Would grow to twenty thousand in that space,
And fly by steam to the Panama race.
When, with audacious hand he flew his kite,
And saw the spark upon his finger light,
He could not dream that Heaven's own fire to-day
Would be the harness slave with which men play;
That States remote and lands beyond the sea,

Wire-linked by that great wonder yet to be,
Should speak as brothers, face to face; that space
Should no more separate the human species;
That even Time should be outdone in flight,
And Canton know this noon what New York knows to-night;

—This mighty use of Nature's grandest force
The Press demands; it turns lightning into prose,
Yokes it in wires, and, while most men sleep,
The Press o'er all the earth extends its sweep,
And ere the sun begins the dawn, each sheet
Gives one day's history of the world complete.

Is the end reached? Ah! no indeed!
The march is onward; and the goal will succeed
The men who listen to this rambling rhyme—
Your craftsmen of the closely coming time—
Will use this grand electric power do more
Than magic wands by wizards suffered o'er;
Will see the lightning whirl the rapid train;
And drive our vessels o'er the st-rumy main;
Will see the bolt that rends the grained oak
Submissive to the kitchen maiden's yoke.
To roast the joint, to boil, to bake, to fry;
Heat the cold rooms when winter's storms are high;
Shed light that rivals Sol's meridian glare—
Earth made like Heaven, for there is no night there—
Do all the drudgery of the farmer's house,
Except, perhaps, the milking of the dairy cow;
—How shall we bound Electric Force, or state
The limit, where its wonders are so great?
Is not this Force Creation's primal nurse—
The motive power of the Universe?

Perhaps you interrupt this worthy sea
And ask, what has the Press to do with jewelry?
The question's fair, and, in a general way,
I make a general answer when I say,
There's nothing on the earth or in the Heaven,
No business, object, purpose, can be given,
No grad of discovery, failure or success,
That is not canvassed by the busy Press.
There is no man of note in all the land
But some grand interviewer takes in hand,
Puts him on cross examination's fearful rack,
And questions till he can't tell white from black.
There are no secrets now; no hidden gem lights
Along Broadway, all making day of night,
The omnipresent Press is everywhere—
At home alike in Earth, or Sea, or Air,
You Jewelers may keep ceaselessly busy,
So does the Press, or false would be my rhyme;
You keep the time at home, but not our care
For time in England, China, India, or elsewhere;
One pair of hands your dial show, but ours
Have hands for fifty cities, kingdoms, powers.
Your jewels—rich and rare I must confess—
Are poor beside the jewels of the Press;
Years, though the very choicest of their kind,
Will pale beside the jewels of the mind,
Those gems of wisdom that by the types are flung,
Broadcast to men of every race and tongue.

You carve heraldic mires, I understand;
Our Herald may be found in every hand;
You have your times of brisk and hopeful trade;
Our Times is on your breakfast table laid;
And where your Sun may sometimes rise or fall;
Our Sun is constant, and still "shines for all";
You search the world, its choicest gems to choose,
While our World searches you for bits of news.
You make a star—perhaps of cometary haste;
Our Star by no such rubbish is debased.
On one point, though, we claim to stand alone,
You have no *Tribe*—that is all our own.
The walks of commerce daily you pursue,
With our Commercial in your pockets, too;
Letters to post—down to the Park you come,
And take our *Evening Post* to read at home.
Express delays are cause of much complaining,
But our Express is always entreating;
If both the wire and the express should fail,
Fall back upon our bright and new *Mail*.
—Thus of the daily Press we've made the run,
And now 'tis time this *press*-ness mess were done.
—But hold! your own Press I had near forgot;
The *Press* papers are in order of course not.
Tinge your CIRCULAR, so trim and neat,
Among art papers it can't be beat;
It gives you more a general view of noise,
Though it gives your trade an organ and a voice,
Tells what it should, and stops when it is done,
And hopes, ere another year each and every one
Of you, and all the jewelers of the world,
Will do their duty boldly—and subscribe.

—Foremost 'mong gentle trades must stand your own;
Jewels from every land and zone
You gather, and with deft and skillful hands
Fashion to gratify the world's demands;

From gems that might adorn the crown of kings,
Down to the country couple's wedding rings;
Bangles and armlets, earrings, solitaires;
Watches that never fail nor need repairs;
Ware for the table—spoon, and urn, and dish;
All that the most extravagant could wish;
Diamonds for head and hands, and fairy neck,
Such as the Queen of Sheba once did deck,
And made old Solomon stare wide to see,
That gorgeous mass of walking jewelry;
Beauty, though unadorned, is beauty still,
But beauty is more lovely through your skill;
Without your art the blushing bride would be
Unenvied by her fairer company;
Women should clasp you in their lovely arms,
For they to you owe more than half their charms;
Age in your brilliant gaze seems like youth;
For your craft wards off Time's corroding tooth,
And long postures that sad and gloomy do,
When dressing cannot longer hide decay.

—As now, still on Let Honor mark the trade;
Remember what the greatest poet said:
"Good name in man or woman, dear, my lord,
Is the immediate jewel of their souls;" the word
Might have been writ in Gospel: 'tis as true
As any Scripture, and 'tis ever new;
Let that good name be still your highest boast;
You cannot lose it save at fearful cost.
Upright and honest dealing be your aim,
And every black sheep bring to instant shame.
So shall you keep that jewel—Honor—bright—
Jewel to which your diamonds are but night.

PRESIDENT HINE:—It is well known to you that our wares are all pure gold and silver. It is therefore meet that we should take notice of the sources of our supplies. I give you the next regular toast,

"Our Gold and Silver Mines: sources of untold wealth."

I have great pleasure in introducing to you one who has not before honored us with his presence. His tongue is silver, and his speech, not his silence, is golden. I present the Hon. George B. Satterlee.

REMARKS OF HON. GEORGE B. SATTERLEE.

Mr. President:

I have been detained by your kindness to the platform, to this late hour, and must say that in the subject you have given me you have given a very dangerous one, sir. It is a subject that is full of suggestion, but I do not intend to refer to one of them at this hour. The sources of supply of the craft of which I have the honor of being a guest to-night probably give them less occasion for thought than the source of any other manufacture or trade, for the reason that there is never a "corner" in the raw material which they use. Therefore they give little thought to it, taking the money of the world for their raw material wherever they find it. Mines are dull, deep, cavernous affairs for those who work in them and those who invest in them. I have only one thought that is not altogether out of connection with the mine, and it is this: That the world for many years has been speaking very irreverently of gold. The lust for gold has been denounced here to-night, and the love of ornament has also been denounced. Now, I maintain that the most innocent of pleasures is vanity. If men and women show an inclination to adorn themselves and their surroundings with ornaments of a prominent character, let them do it. They thus indulge in something that does no harm to themselves or cruelty to others. In our day of civilization, when we talk of money we do not mean money, we mean property, and through all that we mean power, and there is where the opportunity is afforded to speak of gold in its beauties. Certainly the world has preserved more beauties that are human—more connected with the human race than anything else. I had to-night, in looking at Schliemann's descriptions of Mycenae, that we had there a more tender reminiscence of man than any other of the works of art that we have had before. I think out of this æsthetic craze which is now said to be coming to this country there may be one thing gained—a realization of the very great beauty of the models themselves. At this late hour it is impossible for me to dwell upon any other subject. I am reminded by my coming to speak after the gentlemen who have spoken here to-night, of what I have frequently seen in a window of one of your profession: an exquisite diamond held in a bird's claw. I have thought to myself that what a two-dollar topaz held up in one of those claws would be to the diamond, so am I compared with the jewels we have seen this evening.

PRESIDENT HINE:—I give you the last regular toast of the evening:

"The Ladies: whose refined tastes make them liberal patrons of all the arts, and the jewelers: best customers; without them earth would be a desert, and heaven without attractions."

I have great pleasure in calling upon, to respond to this toast, the Rev. Dr. King.

REMARKS OF REV. JAMES M. KING, D. D.

Mr. President and Gentlemen:

I rather suspect that the best thing I can say to you is start and find your wives as early as you can. I have enjoyed this whole entertainment, and especially the remarks of five gentlemen, who thought that we were entirely dependent upon the ladies. Of what advantage can the press, or pulpit, or bar, or even the judiciary be until we have first started, and got our money to patronize the different institutions, and a wife to enjoy life with us. You always close up with women. I remember in the early history of the Methodist Church, that they had three orders of preachers: one was called a circuit preacher, another the local preacher, and the third, the exhorter. The story is told that a good old woman, prominent in the church in her neighborhood, which, by the way, was held in a schoolhouse, meeting the presiding elder one day, and urging him to send her church a good minister, expressed it this way: "Send us a circuit preacher, and if you can't send us a circuit preacher, send us a local preacher, and if not a local preacher, then send us an exhorter." I suppose I will be the exhorter here to-night. I well remember my maiden speech. A political meeting was to be held near by the college I attended, and a great military man had been announced to speak. The great man got as near as the next town, and then telegraphed that he couldn't come any further. Well, to fill his place they sent up to us and chose six college seniors, one of these being myself. On receiving the invitation I went to my closet and made the best of my time; not in praying, but in preparing a speech beforehand. I well remember when it came my turn that night. In attempting to speak I said "Fellow citizens"—my knees knocked together—I wanted to see my mother—my head was dizzy—I staggered about, muttering something that I didn't know anything about, the speechaching to be delivered, but it couldn't come out. After a most ignominious effort of about eight minutes I retired crestfallen. I would have paid at that particular moment the highest price that ever man offered for a trap door. At the close of the meeting, as we were going out in the hall, a great, big-hearted Irishman stepped up to me, and said the only comforting thing during the whole evening. Putting his arm around me, he said, "Cheer up, my lad; your speech was brief but it was short."

I read the other day an article upon the manufacturing jewelry interest of the world, written by the pen of a woman, and I must confess that it shocked me somewhat. She said that in England and France they had rigid rules for testing the quality of jewelry, but in the United States most of the jewelers went by the motto *caveat emptor*; that is, let the buyer look out for himself. I don't believe it. It was a woman who wrote it. She had probably bought her jewelry abroad.

There are at least two classes of persons in this world who cannot possibly live without each other. Woman and the jeweler. In the colony times, especially in New England, jewelry was said to be a device of Satan. Now, I know that in the Garden of Eden there was no jewelry, but Satan got there all the same. The ladies and the jewelers are linked together as the preservers of important events, because dates are fixed by them. When on account of the condition of our streets, this city shall be counted among the buried cities, and some consul from a foreign country—perhaps from New Jersey—shall dig for the treasures of New York to grace the cases of some future genius in the art, there will be found the results of your work. The absence of ladies makes this banquet a desert—a Desert of Sarah. At all events, on looking over these tables at this particular moment, I think that you are making them a desert indeed.

There is one portion of this toast that has been given me, that seems to be going a little too far. Heaven without attractions. The idea of a company of jewelers determining what the attractions of heaven will be. That is altogether too materialistic. I suppose it grew out of the thought that "where your treasure is, there your hearts will be also." Halleck being dead, I have not had his permission to parody one of his poetic gems. He speaks about the relationship of the poet to woman. I think the relationship of the jeweler to women is one more precious.

Well the jeweler at her shrine

May bend, and worship while he woos;

To him she is a thing divine,

The inspiration of his *line*,

His loved one and his muse.

If to his song the echo rings

Of *gains*—his woman's voice he hears;

If ever from his lyre's proud strings

Flow sounds, like rush of angel's wings,

'Tis that she listens while he sings,

Of diamonds, bracelets, golden rings,

With blended smiles and tears.

At the conclusion of Mr. King's remarks, President Hine announced that the regular ceremonies of the Seventh Annual Dinner of the Jewelers' Association were terminated, and wishing them success in the future and a good digestion, he bade one and all good-night.

Thus concluded one of the most charming dinners it has ever been our good fortune to attend, and we are sure this was the sentiment of every one present.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Eighty-ninth Discussion.—Communicated by the Secretary.

[Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. Write only on one side of the paper, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the CIRCULAR for the next month.

THE ANCHOR-DUPLEX ESCAPEMENT.

Secretary of Horological Club:

Quite a number of questions presented themselves to my mind while perusing the article, "The Anchor-Duplex Escapement," page 186, which found no answer, and I have not read anywhere, the answers thereto.

1st. Should the impulse tooth (which stands upright on scape wheel) have any drop when the wheel tooth leaves the roller jewel? If so, how much? Or should the arm on the balance and the impulse tooth work as do the teeth of train wheels, *i. e.*, as the wheel tooth leaves the roller jewel, should the arm and impulse tooth be so near together that the impulse tooth would not drop?

2d. Some time ago a duplex watch was brought to me, and on opening, saw that a new hairspring had been put in, and on inquiry found that the watch did not keep time, which was just as I expected to hear. The hairspring had fifteen coils; enough for a Breguet coiled spring, and very close together; I should judge that *two* were made or coiled on the arbor at one time; you may imagine such a close spring. I told the owner it had to be repaired; when I got to that job I thought I would try Excelsior's plan, page 27, and enlarge it. I heated the plate until the color piece was the same color as the spring, and did not *mangle* or get any larger, so I threw it off to cool and tried again; same result. Now will you please explain the cause?

3d. Excelsior says on page 56, "Arcs are reduced from a turn and a quarter to three-turns." My mind does not quite grasp the idea of a "turn." It cannot mean a revolution of the balance, and I cannot comprehend the exact meaning; so will you please explain what is meant? Yours, E. Y. D.

Mr. Isochronal thought it probable that Mr. D. had formed a wrong idea about the operation of the anchor-duplex escapement. The wheel teeth do not work on the roller jewel at all—that is only acted upon by the fork of the lever, as in the detached-lever escapement. The escape wheel has no other action directly upon the balance except that of the impulse teeth *b* upon the impulse jewel *c*, fixed to the balance arm. The repose teeth, *a*, act only on the pallets of the lever. Consequently, the question of "drop" refers to the drop which occurs when the repose teeth leave the lever pallets, and the impulse teeth fall upon the impulse jewel, and when the inverse action takes place.

The description given is rather blind on this point, merely saying that each impulse tooth acts through 60°, but "of course, 20° for drop should be deducted, still leaving 40° for the actual engagement." This 20° must be divided between the two drops before spoken of. The first drop occurs when the impulse tooth *b* falls on the impulse jewel, as shown at *m*, in Fig. 2. As the balance continues its vibration, the parts pass through the positions *m*, *c*, and *n*, Fig. 2, and then the second drop occurs, by the tooth leaving *n* and the parts taking the position shown in Fig. 1, where the tooth *b* has just left the impulse jewel *c*, and the repose tooth of the escape wheel is resting on the pallet of the lever. This last drop, as is evident by inspection of Fig. 1, needs only to be sufficient to enable the jewel *c* to clear the back of the tooth *b*, (which has just passed off its edge) when the balance comes back on its return vibration. It is equally evident that the first drop must be very considerable, because there must be a long motion of the impulse tooth (behind to the left of) *b*, in order to pass from a position where the jewel *c* could vibrate past it without touching, as in Fig. 2, to the position after the drop, shown at *m* in Fig. 2, where the jewel *c* will intercept the *whole length* of the tooth. The tooth has plainly moved so far into the track of the jewel that the jewel first rests against the tooth, not at its point, but down even to its root or bottom, as drawn at *m*. We therefore see that nearly all of the 20° allowed for drops must occur when the repose tooth passes off

the lever pallet, leaving the position shown in Fig. 6, and the escape wheel advances till the next impulse tooth falls upon the impulse jewel as shown at *m*, Fig. 2—leaving but little drop when the impulse tooth passes off the impulse jewel at *n*, Fig. 2, and the next repose tooth drops on to the lever pallet as seen in Fig. 1. The precise amount of the two drops could only be told by calculation. He had only examined the drawings sufficiently to answer the general question of Mr. D., but would suppose from such inspection that the two drops would be about in the proportion of 16° or 17° to 3° or 4°. He presumed that this approximation would be as close as Mr. D. required.

With regard to the hair-spring, perhaps the upper plate was too heavy. It only needs to be heavy enough to prevent the coils from any tendency to warp out of flat. Any weight beyond that would tend to prevent the enlargement referred to. Possibly the heat was not up to the blue.

A turn of the balance is one revolution or circle of 360°, or half a turn each way from the point of rest. If a point on the balance moves through $\frac{3}{4}$ of a circle in passing from the beginning to the end of its swing or vibration, it is said to describe $\frac{3}{4}$ of a "turn," and so of any other proportion of a turn or turns.

SUBSCRIPTIONS FOR "PRACTICAL HINTS ON WATCH REPAIRING."

Secretary of Horological Club:

I have Excelsior's book on the balance spring, etc., and find it of such value, that after reading your answer to "P. T.," on page 32, Vol. 12, No. 2, of the JEWELERS' CIRCULAR, I have decided to send to you for Excelsior's "Practical Hints." Not knowing your name, I have sent (in this letter) a P. O. money order, payable to Mr. D. H. Hopkinson. If you will please send me the book you will greatly oblige me. Please send by mail if advisable. Enclosed find order for \$3.75. E. B. T. S.

The Secretary said that Mr. S. must have misapprehended his reply spoken of, for on looking back to that number of our Proceedings he found that he had referred to Excelsior's "Practical Treatise on the Balance Spring, and the Adjustments for Heat and Cold, Isochronism, Positions, Rate, etc." That book comprises the first series of the "Practical Hints on Watch Repairing." It is that which is published at the CIRCULAR office, price \$3.50, and that work Mr. S. says he already has. The second series of "Hints," has not yet been republished in book form, and of course will not be until Excelsior has had time to revise the articles for the purpose. How soon that will be we are unable to state, as it depends on Excelsior himself, whose health had been so poor that he was compelled to stop writing, and give his time to his business affairs. We should be very glad to announce that it was ready for sale, for the "Practical Hints" have been a great boon to the working watchmakers everywhere, and their re-publication complete would be an event of note in the trade. Those who have the back numbers of the CIRCULAR for the past five or six years, containing those articles, have a mine of practical information which cannot be found elsewhere at any price. And it is quite evident that they appreciate it, for, although we have often published letters requesting holders of files who were willing to sell them, to write to us and name their price, we have never yet received a single offer.

It would therefore seem that those who wish to obtain the Practical Hints will only be able to obtain the first series of them, (called the "Practical Treatise," etc.) until such time as the second series shall be brought out in book form. The money order has accordingly been returned to Mr. S., and his name entered among the subscribers for the second series—which we regret to say is all we can do for him at present.

The foregoing remarks will also answer Messrs. G. W. C., P. H. McC., K. N., J. S. T., B. L., and others who have made inquiries or requested to be enrolled among the subscribers for the second series of "Practical hints."

CUTTING THE FAN-SCREW OF A MUSIC BOX—HOW CASE SPRINGS ARE MAGNETIZED.

Secretary of Horological Club:

The plan proposed by "Detent" and endorsed by Mr. McFuzee, for cutting the fan-screw in a music box, is good, but I submit a simpler one. Turn a piece of steel wire to the size of the screw, drive brass collets of same diameter on both the old and new screws, place them on a depthing tool and drive both with one blow. Hold a sharp-pointed graver into the thread of the old screw, while revolving slowly, and mark with the graver-point the thread on the new one. Then work out as suggested by "Detent." If two steel wheels with same number of teeth are handy, use them instead of the collets, and with a little practice the screw can be turned and finished with the graver.

With regard to watch-case springs being magnetized, I believe that it is partly due to the way in which springs are finished, by the action of the emery wheel or buffs used in polishing, the friction being always in the same direction, creating a magnetic or electric current, which could be removed by reversing the motion or the spring.

OUTSIDER.

Mr. McFuzee observed that this exemplified the truth of the old saying that there are more ways than one to skin a cat. By taking care to move the hand along so as to keep the graver always pointing to the blank screw at the same angle, a correct copy of the old one would be secured. We hope to hear often from "Outsider." The theory about the method of magnetizing case springs could easily be tested, by taking an unmagnetized spring, polishing it as described, then examining to see if it was magnetized. Also, by taking a magnetized spring and treating it with the polishing wheels in the reverse direction, to find if that removed the magnetism. Have any of our readers ever tried these ways? If so, we would like a report of the results.

The Secretary then read another excellent item from "Outsider," just received, as follows:

MAKING CUTTERS FOR STEM-WINDING WHEELS.

Secretary of Horological Club:

In the September number, page 205, we are told how to make a cutter for cutting stem-winding wheels. The most important part, to give the cutter the proper shape to cut the tooth, is omitted. I do it in the following manner: After having fastened the disc to be made into a cutter on an arbor and turned it true, (and for this purpose I prefer an arbor with a screw nut and centering core, used for turning up mainspring barrels), I make the tool to give the cutter the proper shape for cutting the wheels. To this end I take a piece of soft steel and file one end of it down, to about the size of the space between two teeth of the old wheel, and, holding the filed end firmly on the wheel on a stake, mark on it the space between two teeth with a few smart blows. Then I file according to this mark until it fits tightly between two teeth, harden, polish, and fix it firmly on the slide rest and turn off one side of the cutter, which is carried by means of a dog between the centers of the lathe. When one side is done, I reverse the arbor, so as not to change the depth of the turning tool, and turn the other side of the cutter until the desired thickness of the tooth is obtained. I found this the quickest and safest way, insuring a uniform and well-shaped tooth. To cut the so-called wolf's tooth, (*dent de loupe*) so much used by Swiss makers, I proceed the same way, but instead of reversing the arbor carrying the cutter, I merely take it from between the centers, slide the tool rest to one side, without changing the depth, replace the arbor and turn the other face of the cutter.

OUTSIDER.

CENTERING A PIVOT BY THE RIM OF THE BALANCE.

Secretary of Horological Club:

I am opposed to a prolonged controversy when its usefulness ceases, but as J. H. S. seems to have misunderstood me, you will pardon me for saying a few words more on the subject. A glance at

my article in July will show him how cautious I was to provide against the very error that Mr. S. has fallen into. In the first place I say, "See that the balance runs true and flat," and a few lines below I repeat, "Being satisfied that the balance runs true, then you proceed with your job of pivoting." Now, with all deference to Mr. S.'s opinion, I can't believe that such an extravagantly large proportion (three-fourths) of the work of this kind that we have to do is far from perfect. If such is the case, our boasted advancement in the art is a sham. Allowing that occasionally we do have a job on a balance that is not round with the staff, we certainly cannot remedy or even improve it in any way while putting a pivot in it; but there is nothing whatever to prevent us getting it perfectly flat. This is where my friend S. strays. I disregard the fact of the balance being a little out of round, if such an error exists; but if the balance ran flat on the staff, which was known to be running on its center before the new pivot was put in; then it must run flat on the new pivot. If it does not, you may be sure that the pivot point is not in the center, and if you will alter the point till the balance runs flat you will most certainly find the staff true also. If Mr. S. will only try it practically he will see the accuracy of the method, for a slight deviation, which might be overlooked if occurring at the staff, is made so apparent at the rim of the balance, not by being out of round but out of flat, that it could not pass unobserved.

M. M.

Mr. Uhrmacher said that when the balance was known to have run true with the old pivot, centering by the balance would of course get the new pivot precisely as the old one was, no worse and no better—provided the balance did not get sprung while working at it. If any danger of this existed, it would be preferable to center by the staff and afterwards true the balance to it. He thought it probable that all readers had made this allowance when reading the articles, but we publish Mr. M.'s letter in order that there may be no possibility of mistake.

E. H. A. inquires of Horological Club how he can obtain some practical hints on engraving, such as comes to a jeweler in his business. "Expert," of this honorable body, on call of the chair, said that he knew of no work on sale which would give the desired instruction, but suggested that if the back numbers of this journal, commencing with December 1876, and extending to December 1877, could be obtained of D. H. Hopkinson, the article by himself on engraving in these numbers would answer, as at the time of publication they were very favorably received by persons seeking such information.

TOOL FOR TAKING MEASUREMENTS IN FITTING CYLINDERS, ETC.

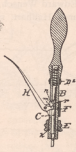
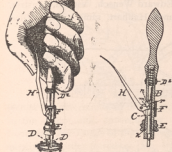
Mr. Clerkenwell showed a very neat little tool from Mr. Theo. Ernst, of Fort Madison, Iowa. No description came with it, nor any indication that Mr. E. makes them for sale, or only sent it in for examination, or as a specimen of his skill and workmanship—not even of its name or purpose. Judging, however, from its construction, it is designed for measuring the heights and distances in fitting in a cylinder. It consists of a brass rod about $1\frac{3}{4}$ inches long by $\frac{1}{4}$ inch diameter, turned down to about 1-32 inch at its lower end. Through the center of this a fine steel plunger is worked by a milled nut at the upper end, which projects the point of the plunger more or less by means of a screw thread upon it. At the side of the tool are two caliper points of steel, which show the amount of this projection, by a corresponding distance between the points—one point being fixed to the body of the tool, the other attached to the sliding plunger within, which it reaches through a long slot in the side of the tool. On the extreme end the plunger is turned down fine enough to go through the smallest pivot hole, and long enough to reach the endstone when the end of the brass body rests on the hole jewel. The distance thus obtained, from one side of the hole jewel, through it to the endstone on the other side, is of course the length of the lower cylinder point—and is shown by the corresponding distance between the two caliper points, by which the proper measurements may be made upon the cylinder while turning it in the lathe.

At the extreme lower end of the brass body on one side, is formed a slight projection or hook. This hook can be used for measuring the other heights of the escapement, and any distance as obtained is of course produced at the caliper points. By resting the hook under the arm of the escape wheel when in place in the movement, it gives the distance from the end-stone to the under side of the escape wheel web and the length of the cylinder to the bottom of the opening. By resting the hook on the top of the arm, the height for the top of the opening is found. This hook will also measure the height for the tooth proper, in the same way. The tool will also measure the heights of shoulders of all kinds, inside distances between shoulders, etc., and for many other purposes. Withal it is simple, light, easily managed and used, and well made. We presume those of our readers who wish, are at liberty to make this tool for themselves, as Mr. E. gives no intimation to the contrary. It would be quite handy for the repairer, and doubtless would find many purchases if put on the market for sale.

We trust that our friends who send in tools for notice will also send full description of uses, construction, and special merits claimed for them, as we may overlook important points, special uses, etc., in our hasty examinations before the meetings. We are always glad to publish such descriptions, and to give the names of those sending or selling the articles, for the sake of encouraging the use of improved tools and other attachments for workmen throughout the country. Every such improvement introduced is a benefit to the trade, and we hope our readers who have devised ways of doing special jobs, or little tools and devices for saving time and trouble, insuring accuracy in working, etc., will favor us with descriptions of them, so that all may profit by them. If each workman should contribute only one good idea, the aggregate thus collected would be something surprising. Not only would no one be the loser by making his improvements public, but everyone would receive back a thousand-fold more than he gave. The true method of progress is not in exclusiveness and secrecy, but in liberally making known the results of our studies and experience for the general good.

Patents.

ROLLER-ABSTRACTER FOR WATCHES.—LUCIUS H. SANDERSON, New York, N. Y.



Claim.—1. In a roller-abstracter, the combination of a cylinder, *B*, formed with the side grooves or channels, *b*, and the side clamping-jaws, *D D*, fitted in the said grooves and secured at their upper ends by a fastening-collar, substantially as described.

2. In a roller-abstracter, a cylinder, *B*, formed with the side grooves or channels, *b*, and openings or notches, *f'*, in combination with the clamping-jaws having at their upper ends little studs, *f*, to fit into the notches, and a fastening collar or sleeve, substantially as described.

3. The combination, in a roller-abstracter, of the cylinder formed with the side grooves and screw-threads, the side spring clamping-jaws, and an adjusting-nut, operating substantially as described, and for the purpose set forth.

4. The combination, in a roller-abstracter, of the cylinder formed with the side grooves or channels and screw-threads, the spring clamping-jaws, the adjusting-nut, the sliding spindle, and the pivoted actuating-lever, substantially as described, and for the purpose set forth.

5. The improved roller-abstracter consisting of a handle, the hollow cylinder, *B*, formed with the side grooves, *b*, notches, *f'*, and

screw-threads, *c*, the spring clamping-jaws, *D*, the adjusting-nut, *E*, the sliding spindle, *C*, formed with the recess, *r*, and provided with the coil-spring, *s*, the collar, *F*, and the pivoted actuating-lever, *H*, all arranged substantially as described.

BUTTON.—William N. Rowe, Washington, D. C.



Claim.—1. The combination, with a button having the elongated shoe, *A*, the shank, *b*, and disc, *B*, provided with the thread-holes, *c*, of the disk, *C*, provided with the slot, *d*, and thread-holes, *c'*, the button and holder being adapted to be attached to a garment or other article with the shoe and slot transversely to each other, substantially as and for the purposes described.

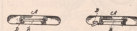
2. The combination, with a button having the elongated shoe, *A*, the shank, *b*, and disk, *B*, provided with the thread-holes, *c*, of the holder, *C*, provided with the slot, *d*, and the recess, *d'*, the button and holder being adapted to be attached to a garment or other article with the shoe and slot transversely to each other, substantially as and for the purposes described.

BRACELET.—James H. Kelly, Providence, R. I., has been granted a patent for the following device:



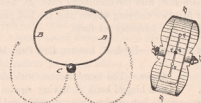
Claim.—The bracelet composed of the wings, *a*, hinged to the outside of the central ornament, *c*, and provided with the levers, *d d*, extending inside the central ornament, in which also is arranged the spring, *e*, fitting closely against said levers, substantially as described.

HOOP EAK RINGS.—Louis Heckmann of Wrentham, Mass., assignor of two-thirds to William H. Wade and Edward P. Davis, same place.



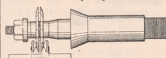
Claim.—The herein-described improved hoop ear ring, consisting of the hoop, *A*, provided with a slot, *D*, of any practicable width, in the side or bottom of said hoop, and the horizontally-swinging ear wire, *B*, arranged to have its free end enter said slot sidewise in closing, substantially as and for the purpose set forth.

BRACELET.—Henry C. Boniface and Ignatius Rice, New York, N. Y., assignors to Rice & Brother, same place. (No model.)



Claim.—A bracelet having the sections *BB* connected at the front by a hinge joint, *C*, and arranged to overlap each other at the rear, in combination with mechanism by which the overlapping ends are adjustably connected, substantially as set forth.

TOOL FOR MAKING GEM-SETTINGS.—Charles I. Loveren, Medford, Mass. Filed Sept. 15, 1886.

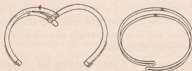


The tool for forming gem-settings from tubular blanks, consisting of the shaft having arranged upon it the milling-disks with beveled outer edges and parallel adjacent sides, substantially as described, whereby two pairs of notches may be cut simultaneously in a suitable tubular blank, and fingers left separating the notches of each pair.

BREASTPIN, &c.—Robert S. Cutting, Providence.

Claim.—A breastpin of other article of jewelry having the retaining rim or border *a*, the rear border, *c*, having projections *f*, removable back *d*, having projections *g* to engage with the under side of the border *c*, and the turn button or bar for holding said removable back in position, substantially as shown and described.

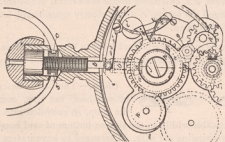
BRACELET.—E. John M. Becker, New York, assignor to Adam Keller, same place, and John C. Downing, Newark, N. J. Filed July 27, 1881.



Claim.—1. The combination, in a bracelet or analogous article, of two parts, one of which comprises two sections, either or both being resilient, and which are pivoted or hinged to the other part at different positions in the length of the bracelet, substantially as specified.

2. The combination, in a bracelet or analogous article, of two parts, one of which comprises two resilient sections, which are pivoted or hinged to the other part at different positions in the length of the bracelet, substantially as specified.

STEM-WINDING WATCH.—John G. Carnahan, Oxford, Ind. Filed Jan. 8, 1881.



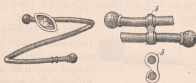
Claim.—In a stem-winding and setting watch, the combination of bent lever *C*, having projections *d* on its short arm, and bearing with its long arm upon the cam-shaped extension *k'*, the stem *B*, provided with collar *c*, and socketed winding-bolt *B'*, journaled in the block between the plates *E F*, with the oscillating yoke *D*, having extensions *k P k'*, the first two carrying wheels and the last provided with a spring, as and for the purposes set forth.

SPRING-LOCK EARRING.—Fred. R. Bassett, Paw Paw, Mich. Filed July 7, 1881.



Claim.—The combination, with the pendant *A* and hinged hook *B*, having square faces *c c'* on its hub, of the spring *d*, made in *U* form and arranged to bear on one of said faces to hold the hook either open or closed, as described.

BRACELET.—Chas. A. Blake, North Attleboro, Mass., assignor to T. W. Short & Co., same place. Filed Aug. 2, 1881.



Claim.—1. A bracelet having overlapping ends and a fastening hook hinged upon one end and adapted to hook laterally over the other, substantially as described.

2. In a bracelet of the class described, the hook *b*, hinged upon one overlapping end between annular flanges and adapted to hook between like flanges on the other, substantially as described.

3. In combination with the overlapping ends of the bracelet and the hook *b*, the ornament attached to the hook and covering the same, substantially as described.

LOCKET.—Christopher J. Theuermer, Newark, N. J., assignor to Theuegner & Umbach, same place. Filed Sept. 10, 1881.



Claim.—1. As a new article of manufacture, a locket or analogous article having the jointless socketed case, in combination with a detachable sliding box, constructed and arranged substantially as and for the purpose specified.

2. The jointless socketed case and the detachable sliding box *C*, provided with the spring *D*, in combination with the loose bearings *I*, substantially as and for the purpose set forth.

3. In a locket, the loose bearings *I*, supporting the arms *H*, and adapted to operate the springs *D*, substantially as and for the purpose named.

BRACELET.—Thefon I. Smith, North Attleboro, Mass. Filed July 28, 1881.



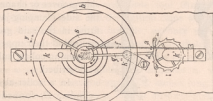
Claim.—A bracelet composed of wings hinged together and provided with a spring, said wings overlapping when the bracelet is closed, and being provided with a hook, substantially as described, or one wing adapted to catch and interlock laterally with corresponding part on the other, in combination with the spring acting to hold the hooking devices together, as set forth.

LOCKET.—Daniel Goldsmith, New York, N. Y., assignor to Stern Brothers & Co., same place. Filed Mar. 7, 1881.



Claim.—As an improvement in lockets, the locket-frame and hinged lid-sections, the edge of one overlapping the edge of the other when closed, and the springs *a*, in combination with the locking device at the lower end of the frame, substantially as shown and described.

ESCAPEMENT FOR WATCHES.—Edward Wensch, Vienna, Austria, assignor of one-half to John James Hanhart, same place. Filed June 30, 1881.



Claim.—1. In combination, with the balance-wheel *B*, provided with the eccentric pin *i* and the scape-wheel *r*, of the spring-arm *f*, provided with the pin *a*, substantially as herein shown and described.

2. In an escapement, the combination, with the balance-wheel *b* and the escapement-wheel *r*, of the spring *f*, the pin *i*, the pivoted rod *g*, with teeth *a' a''* at the end, and the tooth *a* or equivalent on the spring *f*, substantially as herein shown and described, and for the purpose set forth.

3. In an escapement, the combination, with the balance-wheel *b*, having a pin *i*, and with the escapement-wheel *r*, of the eccentric *e* on the shaft of the balance-wheel *b*, the pivoted rod *g*, provided with a fork at one end and teeth *a' a''* at the other end, and of the spring *f*, substantially as herein shown and described, and for the purpose set forth.

A Review of the Different Escapements.

[Translated and compiled from the FRENCH, for THE JEWELERS' CIRCULAR.]

Figs. 6 and 7 represent the forms of anchor most in use in escapements of room clocks; the anchor of Fig. 6 is called *roof-shaped*.



FIG. 6.



FIG. 7.



FIG. 8.

Escapements are also made in which the recoil takes place only on one side; the scape-wheel rests upon the other, in other words, the tooth falls upon a pallet whose face b is nearly concentric with the axis of the anchor, thus permitting the pendulum to move freely from this side, without either giving or receiving impulse. We will not stop to describe these sorts of escapements since their operation is easily comprehended by a short study of the drawings, and an understanding of the other recoil escapements.

DEAD-BEAT ESCAPEMENTS.

Anchor Escapement of Graham, Fig. 9.*—The Graham anchor escapement is nothing else than an ordinary anchor escapement, endowed with repose on the two sides. Fig. 9 shows a style of adaptation most commonly used by this celebrated horologist. It will be seen that the repeses take place on the faces $cd, c'd'$, formed by a curvature of the same circle, whose center coincides with that of the anchor. The scape-wheel teeth act alone by their points.

This escapement must have very little drop, and great care should be exercised not to cramp it, but the watchmaker is rewarded for his painstaking by an extremely close rate, especially if certain precautions which we shall state farther below, are complied with. This and the pin escapement of Lepaute appear to be best adapted for astronomical clocks, as well as all clocks of which the highest possible degree of rate is to be obtained. Let us suppose the diameter of the scape-wheel given, as well as the number of its teeth, which is 30 in the accompanying cut. These two proportions may vary according to wish, and very good escapements may be constructed with others.

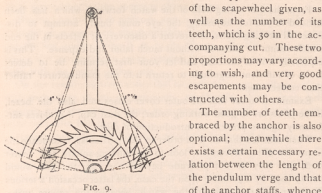


FIG. 9.

results the determination of the arc of the scape-wheel circumscribed by the anchor, and, consequently, the number of teeth embraced. Generally, the length of the anchor staffs must be the smallest permissible, in order to reduce their frictions upon the repeses; but, on the other hand, this reduction produces liabilities which end in decided faults; thus, the shake of each piece must vigorously remain the same; the holes must not become larger; there never must be any wear if it is not desired to have the escapement cramp and the train stand still. The number of teeth embraced by the anchor must therefore be such that the length of the anchor staffs be a mean term which will be comprised between two and thirteen teeth. Kessels and Williams have adopted the number of six to eight as the best. M. H. Robert has established as a rule that the length of the anchor staffs should neither be above the 20th, nor below the 30th part of that of

the pendulum verge, or 1-25, and it may stand still with this proportion. M. Winnerl adopts the diameter of the scape-wheel as extreme limit of the length of the anchor arms, which, in a wheel of thirty teeth, corresponds to a total interval of eleven teeth.

Let us suppose here that the anchor embraces five teeth, and these data permit us to trace all the details of the escapement; for this purpose, we divide into four equal parts the interval at , between the points of the two teeth; we draw the radius is to the fourth of this interval, starting at t , and through the point s , we raise the line se perpendicular to the radius is ; this line will be the tangent at s to the circle which passes through the points of the wheel teeth. We next count five teeth, starting at a , counting as one, and through the point s' , accepted at one-fourth of the interval $t'a'$, starting from t' , we carry a second perpendicular or tangent $s'e'$; the point e' determined by the intersection of these two tangents, will be the center of the anchor. From this point, we trace the circle bd , of a radius et , equal to the distance of the anchor center to the tooth point t or t' ; this will give the curvature of the exterior repese, and the circle bh , of a radius equal to the distance of the anchor center to the half of the interval of the teeth ta or $t'a'$, which will be the curvature of the interior repese. The interval between the circles will give the thickness of the pallets equal to the half of the distance of two teeth; we have not taken into account the shake necessary to be left to prevent friction. This shake, which should be the least possible quantity, only sufficient to prevent cramping, might be otherwise traced with the figure; it will be determined by means of two circles very little different from those already traced, and which may be placed between the two at the distance of the half-interval adopted for the shake, so that the real thickness of each pallet added to the shake, forms exactly the half of the interval between two teeth. The quantity of the shake is equal to the height of the drop.

It now remains to trace the inclination of the impulse faces of the pallets. We stand in need of a fourth known quality, when doing this, optional like the three others, but nevertheless bounded by certain limits—the *lifting angle*. In the ordinary long clocks, this angle may, without causing any inconvenience, be from 4° to 6° to each side of the vertical; and in short clocks, more than that; but in *pieces of precision*, where the pendulum beats seconds, the lifting angle must not exceed one degree or one and one-half to each side of the vertical, in 2° or 3° . It may be extended to 4° in clocks beating half-seconds. We will take 4° for our illustration.

We now start from the generally adopted data, that as soon as one tooth t escapes, the other tooth t' must fall upon repose upon the angle formed at t' by the faces of repose and impulse; the points tt' will therefore form the extremities of the pallets. To find two other points, we carry the radii $eg, e'g'$, forming angles of 4° with the lines et, et' ; the intersection of these radii with the circle $b'd$ will give the other extremities of the pallets. Joining $ot, o't'$, we have the impulse planes of the pallets for a total lifting of 4° . Thus will be found in the same manner the direction of the planes for every other lifting angle.

In the primitive Graham escapements, the repeses took place upon a like circumference, $ie'ed$, passing through the center of the scape-wheel, consequently *beyond the tangent*. Later these dispositions were modified by placing their circumference at a tangent at $td's$, where the lines at, as are perpendicular upon the radii ot, os , and therefore tangents to the circumference of the scape-wheel. But the anchor arms thus were of unequal length, and they were finally made of the same length, as will be seen in Fig. 9, by limiting the places of impulse by two circumferences described from the center of the anchor, and including between them the points of the tangents, in such a manner that the exterior repese is thrown back on the outside, to the normal point of a quantity precisely equal to that to which the other repese is displaced on the inside. This mean term is presented by the description of the anchor in the preceding construction, and to-day is the generally preferred one.

*NOTE.—Graham stands foremost among English horologists; his cylinder and anchor escapements for watches and clocks occupy the first rank, as well as his mercury-compensated pendulum. This artist rendered himself still more famous by the excellent astronomical instruments he executed, among which may be mentioned his sectors of a radius of more than four metres.

Considering the requirement of the proportions, the impulse faces are never shaped in accordance with the curvatures, which evidently would be the strict form; planes suffice perfectly for this object, even in cases where the highest degree of precision is sought to be obtained. In finer clocks, the anchor pallets are of stone, as will be seen in Fig. 11; but more generally the anchor is made of steel.

Anchor Escapement of Kessels, Fig. 10.—This escapement has been employed in astronomical clocks, which this celebrated Danish horologist constructed for a great number of observatories. Its good proportions may be regarded as having the sanction of experience.

Anchor Escapement of M. H. Robert, Fig. 11.—By means of appropriate machinery, M. H. Robert has succeeded in manufacturing for clocks for civil use, escapements having the proportions and qualities of those adopted for clocks of precision. Fig. 11 represents one of his models. The pallets are of fine stone, inserted into brass anchors. The wheel-teeth, Fig. 12, present the perfected form which this horologist employs in his finer clocks; he even takes the precaution to pierce the end of each tooth with a little hole, so that the oil driven away by the encounter of the escapement returns to the little face, which it is of importance to keep moistened with oil.

Same Escapement, Fig. 13.—This disposition, peculiarly applicable to half-seconds clocks, permits the making of the pallets upon the turning lathe, whereby a perfect concentricity of the repose is guaranteed; *amc* is a steel collet, turned inside and outside, whose part *amc* has been removed for the passage of the scapewheel teeth; this collet forms the anchor. Its extremities *a, c*, discharge the functions of pallets. It is adjusted to hard friction upon the washer *f*. The scape wheel is of tempered steel.

We give, according to M. H. Robert, the dimensions of the different parts of the escapement for a half seconds clock:

Radius of the exterior circle of collet.....	millim. 11.0
" " interior " "	10.8
Thickness of collet.....	0.2
Length of pendulum.....	250.0

The scapewheel has 30 teeth; the anchor spans over 4°.

The advantages of this escapement are that, first, the repose takes place nearly upon a same lever arm, (the difference is only 1:55), wherefore an equality in the two actions of each tooth to propel the pendulum occurs; second, the repose are exactly concentric.

(To be continued.)

Practical Treatise on the Adjustment of a Cylinder Watch.

[Translated for THE JEWELERS' CIRCULAR from the 2d prize essay of Vincent Laner.]

By "adjustment" is understood the inspection and correction of a new watch, to remedy all existing defects, and to place it in a condition necessary to serve the purposes of a timekeeper. The faults and misproportions occurring in watches, especially those of a cheap kind, are very diversified; they mostly consist of irregularities of the power-producing parts—the barrel with spring, stopwork, etc., in interferences of the several moveable parts among each other, on the bridges, plate, dial, or within the case; its disproportions of sizes of wheels and pinions, as well as in the most multitudinous errors in the escapement, the balance, together with the spring.

It is of great advantage to quickly ascertain the defects of a watch and fix on the remedy to correct them in a durable manner, and it

is necessary to pay the strictest attention, when taking a movement apart, on their discovery, where such irregularities are to be found, to know by a future examination of the pieces, which of course must take place, where the chief defects are hidden.

Next will follow a treatise of the remedying of such defects on the single pieces, and in conclusion a condensed appendix on the replacing of injured parts by new ones, and practical hints on working methods and tools.

The following is the nomenclature of the wheels: Barrel, center wheel, third wheel, fourth wheel, scape wheel; of the pinions: center pinion, third pinion, fourth pinion, and scape pinion.

When the expression "from above" occurs, in regard to pivots, jewels, etc., that side of the movement is understood upon which the bridges are placed. I mention this because I have found watchmakers who call the dial plate above, and thus to prevent mistakes.

I presuppose that at the execution of any of the within specified pieces of work, the watchmaker possesses a chuck turning lathe, and several measuring instruments.

The adjustment of a watch for a conscientious watchmaker is a very important labor, because he is not alone called upon to set it into motion, and thereby satisfy the customer, but also to durably remove and correct any existing defects and shortcomings. The remuneration for the adjustment of a low-grade watch, of which I intend to treat—4 jeweled—is generally very low, and must be taken into account. By several pieces of work I have indicated two ways of doing it—one is thorough and durable, the other a makeshift, in case the grade of the watch is too low to admit of extensive repairs.

While I feel diffident to intrude with my contracted knowledge upon the attention of the public, I hope my fellow laborers will treat it in a kind manner, especially as I am no expert in writing.

CHAPTER I.

PRIMARY EXAMINATION OF THE MOVEMENT WHEN REMOVING IT FROM THE CASE.

From the first taking hold of the watch forward, which has been handed to you for adjusting, the eye must busily attempt to discover all existing faults, to prevent a discovery of defects in the end which cannot be removed without much labor and expense. This is especially true of the case, and let your first scrutiny be to detect faults of sufficient magnitude to return it to the manufacturer rather than correct them.

Examine it to see that the outer cover closes well, also the bezel, if the joints are in good working order; the dust cap, if it closes sufficiently tight to prevent an introduction of dust.

When satisfied that all is in order in this particular, commence the inspection of the movement; look to the winding-square and center staff, that they do not protrude beyond the cap; the first would betray itself by a pressure upon the case, the latter occasion a serious disturbance in the motion of the watch, because the square turns, and thus produces a constant friction; the square soon buries itself within the soft metal—gold or silver. If the mentioned parts do protrude, remember to remove the superfluous amount.

When this has been ascertained, open the dust cap, look at the movement, whether it has sufficient room in all directions, especially the barrel and the balance, that they do not scrape on the case rim; anoint the index plate with a little red oil mixed together, close the case, and see at the reopening if it has left traces on the inside of the cap. If so, remember to correct it.

When the occurring errors have been taken notice of, and you are satisfied that they may be overcome without great difficulties, open the bezel and examine the hands, if they stand at necessary height, and pass over each other without interference. Anoint the canon pinion of the minute hand also with some red oil, close the glass and see if it leaves an imprint; if so, the hands must be placed lower, or a more arched glass be substituted.

Now remains only to investigate if the case holds the movement securely, and is well retained by the case screws. Then remove the

movement carefully from the case, to prevent the balance from catching on the ring, which might cause the breakage of a pivot or the cylinder. The case is carefully put aside, and we commence the dismounting of the movement.

CHAPTER II.

DISMOUNTING THE MOVEMENT.

The taking into pieces must be done with all care, to prevent an accidental bending or other damage. Remove the hands and dial, and scrutinize to see if the minute work is in order, its depths good, no part goes too high or too low, if none of the wheels interfere with the barrel or stopwork, etc. Does one or the other occur, take notice, and see how it may be remedied afterward.

Next let the spring run down, which is best done as follows: Cut a cleaning stick wedge-form, take it between your teeth, seize the movement in one hand and wind it with a key with the other, by a trifle, whereby the click spring is raised; push the cleaning stick under it, and let the spring unwind slowly.* The letting down of the train is not advisable, as it may be followed by serious consequences, it happens not unfrequently that the pivots have either no oil, or only very little, and the pivots may be seriously damaged, sometimes broken or wrenched out.

Inspect the escapement preliminarily, if the balance has sufficient shake, as well under the center wheel as above the scape-wheel bridge; if the banking pin may catch on the case rim, joint, or case spring; also see if the screwhead of the horizontal bridge is high, that it may scrape on the dust-cap joint and produce cappings.

Examine the balance spring, if it is of appropriate size, by setting the balance in motion, and compare with some timepiece. If the vibrations are slower, the spring is good; if two quick, however, or equal in rate, it must, if the first, be replaced by another one; if the second, it is doubtful whether it will answer, and the question whether the balance has been counterpoised or not, or is otherwise heavy, will decide it. The investigation is of importance in so far as to prove whether the spring is of use or not.

Having committed to memory any incorrectness, examine if the cylinder or scape wheel stand suitably high to each other, then take out the first and examine it as to its fitness. By the scape wheel notice if it moves free in every respect, that it is not too large, interferes with the fourth pinion, etc.

On the remaining train notice that its parts do not mutually interfere with each other, or rub in their sinks; see that the third wheel well engages with the center pinion, as it occurs frequently that the teeth seize only with half their faces.

Having inspected the last three wheels and removed them, we come to the center wheel and barrel; it is of the utmost importance to inspect these two parts closely, to examine their suitable proportions to each other; without this you will merely stumble about in obscurity.

As regards the height of the center wheel, it is in a certain manner determined by the balances and the center pinion; the first will require the wheel to stand as high as possible, but the center pinion must also be taken into account, as it is not always possible to put in a new pinion, in case the upper shoulder be rather long. The barrel will mostly decide the amount, since it is limited by the minute work and dial. This barrel is often hung in a very bungling manner; it sometimes rubs very hard on the center wheel, at other times it goes too deep, and its teeth almost pass by the pinion, in case this happens to be rather short, or it scrapes on the plate, or dial, minute work, etc. It occurs not unfrequently that the barrel stands obliquely, either in consequence of an untrue running of the barrel or the inexact insertion of the center staff.

*REMARK BY PRIZE JURORS.—The running down of the mainspring may be effected in a more expeditious manner, before removing the movement from the case. When examining the work, wind the spring a little, and it is easily let down by placing the watch upon a magnifier or other thing, taking a screwdriver in the left hand (or wedge-shaped cleaning stick) and a watch key in the right. It is easy during the letting down to support the movement with one or two fingers of each hand around its rim, to prevent the power of the mainspring from throwing the watch about.

As it is often necessary to bush the barrel holes and polish the pivots, it is also important to be satisfied whether the barrel may remain in its actual position or has to be changed, either higher or lower.

The center staff is best taken out in the following manner: Seize the square with tongs, the jaws of which are laid with brass, or a key, the canon pinion, on the contrary, with tongs of the screw polishing tool, and endeavor by turning both parts, to take them apart. If the canon is driven on too tight, and a danger of breaking the center staff may be feared, take a key easily fitting the square, place it upon an anvil or vise, and carefully drive out the staff.

Next unscrew the barrel and center wheel from the plate, remove the stop finger, wind the spring to examine if it rubs, either within the barrel, or the coils among each other; if such defects are very pronounced, it should have been noticed at the time of letting it down. If it winds easy and free, count the turns, as they lie free within the barrel; an average is from $12\frac{1}{2}$ to 14 coils, and will mostly be found in good watches, but reasons may compel sometimes, to deviate from this number. If the spring is too long, break off as much as necessary; if it possesses any other defects, such as being too strong, weak, small, wide, or rough or rusty, etc., put it aside at once, to insert a better one with time. Finally, after having examined the clickwork, we have finished the dismounting, and may know already if the cost of repairing will exceed the profit.

I next proceed to the description of the different labors as they occur, according to my system of working, but before I commence, I must say something about depthings.

CHAPTER III.

DEPTHINGS.

A great amount of care should be paid to the depthings, and only with perfect ones is it necessary to equally transmit the motive power generated by a falling weight, or the elasticity of an elastic spring, to the balance of a watch or the pendulum of a clock. To produce a good depthing it is necessary beyond everything else to have the pitch circles of wheel and pinion proportioned to each other, as their number of teeth, or what is equivalent, as the number of revolutions.

If, for instance, there is a wheel with 80 teeth and a pinion with 10 leaves, it follows that the pitch diameter of the former be eight times as large; if it be an 8-leaf pinion, the pitch diameter of the wheel must be ten times as large as that of the pinion.

If the center distance is given, it must be divided into as many parts as the sum of teeth and leaves amount to; in the first case, $10+80=90$, in the second, $80+8=88$.

Let us scan the first proportion somewhat closer; we would have to divide with the sum of $80+10=90$; but as 80 stands 10 as 8 to 1, we may for the sake of simplicity insert the latter reduced value, thereby simplifying the calculation, and we therefore put $8+1=9$.

While by the use of the former numbers 90 parts are produced, of which 80 parts are the pitch diameter of the wheel and 10 parts that of the pinion, we divide with the latter smaller number the depthing distance in nine parts, of which eight belong to the wheel and one to the pinion.

Let us suppose the case that to a depthing distance of 12.5 mm., we shall ascertain wheel and pinion with the expressed number of teeth, and we would have:

$$\frac{12.5}{90} \times 80 = 11.104 \text{ as the pitch radius of the wheel;}$$

$$\frac{12.5}{90} \times 10 = 1.388 \text{ as the pitch radius of the pinion.}$$

If we insert the reduced values, we also have:

$$\frac{12.5}{9} \times 8 = 11.104, \text{ the pitch radius of wheel, and}$$

$$\frac{12.5}{9} \times 1 = 1.388, \text{ the pitch radius of pinion.}$$

To find the pitch diameter from this we multiply the sums found by 2, and we have $11.104 \times 2 = 22.208$, for pitch diameter of wheel, and $1.388 \times 2 = 2.776$, for pitch diameter of pinion. Adding the two radii, of $11.104+1.388=12.492$.

[The subject of depthing has heretofore been so thoroughly treated by Excelsior and other eminent writers in the JEWELERS' CIRCULAR, that a further translation was deemed superfluous.]

Patented Improvements in Jewelry.

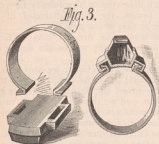
We give illustrations of a few recently patented improvements in jewelry. The invention shown in Fig. 1 is an improved method of incrusting and enameling precious stones, such as onyx and agate. It consists in first engraving the design into the stone to be ornamented, then pressing or moulding a thin plate of gold into the inden-



tation, then removing, enameling, and burning the plate, next replacing and cementing the plate into the stone, and finally grinding the surface of the enameled portions flush with the surface of the stone. This is the invention of Messrs. Peter Appel and Charles P. Appel, of West Hoboken, N. J.

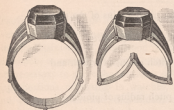


Fig. 2 represents an improved fastening for ear jewels, patented by Mr. G. W. Washburn, of West New Brighton, N. Y. In this invention a neat and inconspicuous curved tube is made to inclose, conceal, and protect the bolt and spring of a secure looking device, adapted to fasten automatically with a distinct "click," which gives audible notice to the wearer when the ear wire is locked. The ear fastening is readily unlocked by the wearer or an attendant.



hooks upon it ends, so that the setting may be detached and replaced by another at the will of the wearer. The engraving shows the ring and setting separately, also a sectional view of the two parts put together.

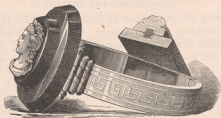
Fig. 4 show a combined finger and scarf ring, patented by Mr. Carl Bachem, of Pforzheim, Baden, Germany.



The invention consists in making the ring in five parts, which are hinged together so that the two hinged sections opposite to the central stone setting may be sprung inwardly for use as a scarf ring. The hinged sections adjoining the stone setting are provided with raised cheeks, which abut against the setting when throwing the remaining sections in outward direction.

An improved method and device for connecting gems, patented by Mr. August Schaffer, of New York City, is shown in Fig. 5. The

object of this invention is to connect agates and similar stones of natural or artificial color, cameos, and the like, in such a manner that the upper stone projects above the surface of the lower stone or table. By this connection a larger variety of combinations can be made from this class of stones, to be used for articles of jewelry or



other purposes. The improvement consists in connecting two agates or other stones by recessing or dovetailing the lower stone or table on its upper surface and the upper stone or step at its bottom surface, inserting into the recess a connecting piece or key of copper, and filling up the small wedge-shaped spaces or cavities between the connecting key by electro-deposition.

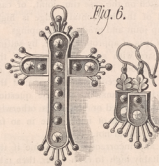


Fig. 6 shows a very pretty article of jewelry that may be changed so as to be used for different purposes. This piece of jewelry is made in the form of a cross, with detachable side pieces, pin, and hanger, so that by removing the side pieces, the middle piece can be used as a lace pin and the side pieces as ear-rings. This invention has been patented by Messrs. Leon P. Jeanne, of Woodside, and Louis P. Jeanne, of Greenville, N. J.

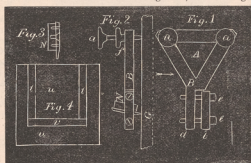
The Jewelers' League.

THE JEWELERS' CIRCULAR is the exclusive official paper of the Jewelers' League and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address Jewelers' League, Box 4001, P. O., New York, or the office of THE CIRCULAR.

At the regular monthly meeting of the Executive Committee, held on Friday, October 7, the applications of the following named candidates were acted upon and accepted: John H. Astruck, Louis Engel, Abraham Harris, Stephen N. Hyatt, and C. T. Voelker, New York City; Wm. N. Child, Damariscotta, Me.; Henry W. Curtis, Knoxville, Tenn.; Henry Delmel, Sandusky, Ohio; Wm. H. Foulds, Taunton, Mass.; John A. Harrington, Boston, Mass.; John S. Holmes, Mobile, Ala.; Chas. E. Howe, Pittsburgh, Pa.; Frank Jacobson, Chicago, Ill.; Ossian C. Jaquith, Quincy, Ill.; Silas N. Jenkins, Anderson, Ind.; Leo T. Le Bron, Galena, Ill.; Henry F. Liebenow, Manitowoc, Wis.; W. B. Marsh, Jr., Brooklyn, N. Y.; John Oberg, Newark, N. J.; Conrad Scherer, Lexington, Ky.; Wm. Schmidt, Milwaukee, Wis.; Frank L. Taber, Holyoke, Mass.; Joel F. Talbot, St. Louis, Mo.; John H. Teal, Binghamton, N. Y.; Peter C. Tryner, Maroa, Ill.; Henry J. Woodside, Portage la Prairie, Canada, and John Wm. Young, Petersburg, Va., making the total membership at that meeting number 1,439.

Properly authenticated proofs having been presented of the death of George D. Stevens, the amount in the benefit fund, \$8,684.70, was ordered to be paid to his widow, and the usual assessment was voted upon each member.

will please consult the number preceding this—Oct. 1881—and in the present article, when I referred to cuts in that number, I will add the initials in a parenthesis: (P. N.—preceding number) should be carefully turned of steel wire spring, tempered; they should be finely polished, and slightly taper to compensate for wear; they should work tight enough at the joints so as to require a trifle more than the weight of the piece to move them. The steel jaws $B B'$ (P. N.) are required to be very accurately finished—the edges where they meet closing perfectly parallel; indeed, these jaws and the step-shaped piece E cannot be too carefully made. The way to proceed is to make all the parts except the steel step-shaped piece E , and put them together. The small piece f , can be supplied for the time by a brass substitute and a small screw through at i , to work against the



piece H . With such an arrangement you can measure as well for the purpose of making the step-shaped piece as if you had it done. Here the reader might ask why not leave it with the screw in; because you cannot duplicate your measurements, if once the screws gets moved. A grinding triangle is indispensable for forming and polishing the jaws $B B'$. I presume most of my readers possess one, but for the benefit of those who do not I will describe one. They are not only useful here, but for a dozen other things, and will be referred to frequently in the course of these papers. The sides of the triangle should be about $2\frac{1}{2}$ inches on the outside and fully 3-16 thick when finished. The form is shown at Fig. 1. It should be of cast (hard red) brass, but can be made of No. 6 sheet brass. The angle B is provided with a fixed projection shown at d ; this is connected to b by two long screws ee . These pins $b d$, with the screws ee , form a clamp for holding work to be ground and polished. At aa are shown two screws for leveling. Fig. 2 is an edge view, showing the screws aa ; f is a loose nut; the object of this nut (it is called a *jam nut*) is to prevent the screws aa from turning when grinding on the ground glass slab; when the screws are all right, turn these (one on each screw) down tight on the triangle. Fig. 3 shows the brass holder for grinding the jaws, and will be described further along. The screws aa should be about 1-10 of an inch in diameter, made of steel, and the ends which come in contact with the glass slab left as hard as fire and water will make them. The screws ee are a trifle smaller in diameter and spring tempered. We will now describe how to make the jaws $B B'$ (P. N.). The pieces $G H$ being made of No. 12 brass, the steel for the jaws $B B'$ should be a trifle wider than the thickness of the brass, so as to finish and polish to the same width. The steel should be about 1-20 of an inch thick; rough them out, drill and countersink the hole for the screw r , and the two steady pins shown in the cut; also in one drill for the head of the screw u ; the pieces can now be hardened, and all but the meeting edges at h , run down to a spring temper; the meeting edges can be left hard. The grinding of the jaws is conducted as follows: We will suppose it is the jaw B , which we are fitting up; the roughed out jaw has actually been screwed fast to G , the steady pins in and the screw u in place; the holes (in the jaw) for the steady pins should be tapped, and soft steel pins, slightly taper, should be screwed in, letting the jaw do the cutting—it does not need a full thread; these pins should protrude some little on the outside, so as to permit their being taken hold of and screwed out. Take out the steady pins and lay the side which

goes next G on the ground glass slab, and with oil-stone dust and oil grind out all file-marks and get it flat. The grinding in this case is done best by applying the end of the finger on the back, and pressing it on the glass slab. After all file marks are removed and it is perfectly flat, polish the side you have ground; but before polishing, the piece (the jaw) must be washed with soap and water to remove any grit. The polishing can be done on a tin lap. This is a block of block tin $3\frac{1}{2}$ inches square and $\frac{1}{2}$ inch thick. One can be made by casting. Take two pieces of pine board six inches square; get a strip of pine $\frac{1}{2}$ inch thick and $\frac{1}{4}$ wide; cut off two pieces four inches long, and tack them $3\frac{1}{2}$ inches apart on one of the pieces of board, as shown at Fig. 4; r represents one of the boards, and t the two mentioned $\frac{1}{2}$ inch pieces; cut another piece of $\frac{1}{2}$ inch stuff, 5 inches long, and tack it as shown at v ; now apply the other piece of board so as to make a little tank $3\frac{1}{2} \times 4$, turn the boards up edge-wise and fill the space with melted tin—it will require two pounds—you will have some left, but it will be useful for polishing laps in your lathe. Of course the sides will not be exactly flat, but by scraping and testing it with your glass slab you can make them so. Vienna lime and alcohol are used on the tin lap; in absence of the lime use diamondine. Vienna lime is denounced by many as an inferior polishing material, its enemies claiming that the so-called black (or perfect) polish cannot be produced with it—this is a mistake, as a perfect dark mirror-like polish can be obtained with it; but this is a matter of trivial importance; it works rapidly and produces a polish good enough. Here is about the only place that "good enough" can with propriety be applied to watchmaking; in matters of accuracy, nothing is good enough except actual perfection; but as to the mere polish, it is much like a coat and a man. The pieces for the jaws should be clamped together (or temporarily joined with soft solder) when drilled for the screws and steady pins, so as to have the holes in each alike except for the screw head u (P. N.); this can be drilled after they are taken apart. The small brass piece shown in Fig. 3 is a trifle thicker than the jaw to be ground is wide; it is shown as if split, showing the jaw with the steady-pins and screws u (P. N.). The screw you intend to use should be used to fasten it to the piece N . Screw the jaw fast to the brass piece N , and clasp the brass piece in the clamps db , Fig. 1, letting the jaw protrude as shown. Now, with the screws aa , bring the jaw flat with the glass. To illustrate, suppose we should retract the screws aa , until the lower ends were quite even with the triangle; now lay the triangle, with the piece N , flat on the ground glass slab, the line G , Fig. 2, representing the surface of the glass; if a pointed instrument as shown at the dotted lines x , is applied to the back and center of N , the general rough surface of the stub jaw to be ground will be brought parallel to the surface of the glass; if now the screws aa , are run down until they touch the glass, and the jam nuts f , are screwed down tight to keep the screws aa from turning, the surface of the jaw can be ground flat and polished (remembering to wash the work before polishing)—leave the job in the triangle, when it is polished. Shift the piece N , in the clamp, and grind the bevel which hits the extreme edge of the jaw, as shown at h , Fig. 1 (P. N.). The steady pins can be left in when the edges of the jaw is ground, as it is necessary to remove it from N in this operation—the steady pins can rest against the clamp bd ; in the ultimate grinding of the meeting edges, one can be assumed to be correct and grind the other parallel to it; but this will be further discussed. The grinding of the step-shaped piece is done with an arrangement entirely dissimilar. This is a temporary affair, but it can be used in many operations of fine finish (with slight modifications) on several parts of watches—detents for chronometers, scape wheels, etc. The step-shaped piece should be made of steel, a trifle thicker than the pieces $G H$ (P. N.), as it is to slide freely, but not sloppily, between the plates L of the calipers; the two extreme ends of it are (as shown) so high that the piece cannot be removed until after the piece F . The bottom which slides on the piece H , is simply ground flat and polished. The surface of the steps should be nearly the full width of the metal, and as the instrument for grinding

the steps will grind the surplus perfectly parallel, it will be understood that the broader the surfaces which come in contact, the less the liability for torsion of the jaw. The description of the machine for grinding the piece *F*, as well as how to divide the dial, is necessarily deferred until my next communication.

Distribution of Prizes to Watchmakers' Apprentices and Journeymen, at the *Chambre Syndicale de l'Horlogerie*, at the Palais de Trocadero, Paris.

ON Sunday, July 3, 1881, at two o'clock, took place the distribution of prizes to apprentices and journeymen watchmakers, at the Trocadero. The assembly was presided over by M. Spuller, the member of legislature of the 3d arrondissement, assisted by several gentlemen, both of the scientific as well as of the horological world.

The audience, estimated at 7,000, had responded with eagerness to the public call. Everyone was in his Sunday dress and mood, and understood the importance of the subject—so useful, so French, so Parisian; everyone had come with the purpose of listening and applauding.

MM. Rodanet and Spuller pronounced the discourses, which we translate. M. Lioret presented the prizes to the victors.

M. Rodanet spoke as follows:

LADIES AND GENTLEMEN—It is with a lively satisfaction that I experience at each of our distributions of prizes, the ever growing importance and interest of these annual gatherings. The announcement of these artistic and industrial tournaments is, each year, awaited with impatience by the public. From all parts of France, they are ardently desired by this pleiade of watchmakers who support with firmness the banner of our art. Our reunions have served as models to those which the *Chambre Syndicale de Lyons* instituted during the last year, and we may feel proud of the honor.

Heirs of the grand principles of '89, we are stimulated by the sentiment of the rights and duties imposed on us by them. Our illustrious ancestors abolished the master and wardenships, and finally gave us our liberty. We endeavor, in the plenitude of this liberty, to discharge as men of honor our professional duties. We seek to work for the common good, instruct and encourage infancy, recompense the man, and hasten to succor old age. (Applause.) We aim to join our efforts with those of our rulers; to shed light, where still reigns obscurity; to enlighten ignorance by teaching; to contribute, in fact, to the utmost of our ability, to the general good of our country, and to the moral development of France. This is our programme. (Applause.) This programme, gentlemen, is the programme of our young Republic. The organization of apprenticeship occupies the attention of all France; this grand problem is the subject of study everywhere; the desire to raise a body of well-instructed and capable workmen is expressed everywhere; not to be obliged to draw them from foreign countries. Apprenticeship is unsatisfactory at Paris; it is on the eve of disappearing. No good apprentices are produced at present—but plenty of bad ones. I attribute this decadence to several causes. An apprenticeship at watchmaking is long, difficult, discouraging at its beginning. The pupil and his work require to be continually watched, which surveillance absorbs all the time of the master. The apprentice's work is unproductive; if it be desired that the youth should learn something, he must make and remake the same piece, to obtain that finished touch, that delicacy of hand which constitutes the really capable workman. All this painstaking, insufficiently remunerated, keeps the master from taking apprentices.

The division of work, which otherwise is a great progress for rapid production, is another of the chief causes of this inferior condition of the present apprentices. The employer, in order to make a profit on the labor of the youth who is confided to him, specializes his work. He compels him to every day make the same piece, and thus educates an incapable workman. (Cries, "That is true.") The modern tools are chiefest of all. The present automatic machinery, marvelous in its executions, and which appears as if actuated by the

inspiration of an innate intelligence, is of immense advantage for the general interest, but it suppresses handwork. Before such a machine, the duty of a workman or apprentice dwindles down to that of a mere hand-laborer. They manipulate it without comprehending its functions, and very often gather the pieces it produces, without inquiring into their application. The thirst of gain, both by the patron and the apprentice, also produces bad workmen. The youth desires to earn a salary; the employer desires productive work. In the large centers, where living is so expensive, the employer often speculates upon the work of the youth, and in this case, teaching is entirely sacrificed; the apprentice is taught only sufficient to produce at a vile price, pieces which competition daily presses still lower. One manufactures at a cheap price, handwork being but insignificant. At the time of his entry, he is not able to produce anything, and he is then used as scullion and shop boy. (Cries of "Unhappily true.") His professional instruction remains stationary, and he terminates his apprenticeship void of any thorough understanding of his calling. The personal liberty he enjoys to run on the street, exposes him to bad company; he learns vicious habits which are of terrible consequences to him in after life. (Cries of "True—very good.") Such deplorable occurrences are numerous in France; they have often come to my notice as inspector.

Finally, I desire to give a piece of advice, moral as well as important: Abolish the present system of apprenticeship. The child must associate with comrades of his own age during the time of learning his trade. He is thus withdrawn from the contaminating influence of workmen, and does not acquire the libertinism of language and morals existing in the shop. M. Denys Poulot, Mayor of the 11th arrondissement, wrote a very excellent work, under the title of *Le Subtime*, on this subject, showing with great clearness the deplorable consequences resulting to the child from such an association. It has become urgent to radically change the unfavorable conditions of Parisian apprenticeship. To do this, a school of horology became indispensable, and it was necessary to create one on the pattern of those already existing and working for many years at Cluses and Besançon, by modifying their programme to suit the needs of Paris.

Since then, many trials were made looking to this end; difficulties of all sorts presented themselves and appeared to be insurmountable. How could we find a sufficient capital, and resources sufficiently large to defray the considerable annual expenses? Who would dare to become pecuniarily responsible for the account of a society not recognized as of public utility? Who would devote himself to its creation? Nevertheless, this school has been created. It performs its work, the only one of the kind in France, for private instruction. Bold and unflinching, impelled by an inflexible will, we have dared all in order to succeed, and we have succeeded! The school exists. Its social capital is 60,000 frs., and its reserve funds are represented by 1,800 frs., annuities of the state of France. It pays 14,000 frs. yearly for running expenses. Its building is ample, well organized, comfortable, provided with important and modern tools. Two practical and three theoretical professors teach to twelve young men the art of horology, and impart to them a knowledge which will enable them to become capable watchmakers. The apprentice is removed from all noise and outside disturbance. All his time is devoted to study and to work, and all work is performed under immediate supervision; thus the progress of the pupils is rapid, and their desire for further instruction is constantly growing.

M. Spuller spoke as follows:

LADIES AND GENTLEMEN—While returning to the gentlemen who organized this festivity, my sincere thanks for having conferred upon me the honor of its presidency, permit me to say that I well know the reason why I occupy this place, in which so many eminent men have succeeded each other, and who have inspired you not alone with good counsel, but also with the charm of their word and talent. Your honorable and devoted President, M. A. H. Rodanet, has left little for me to say. He has placed the many advantages in so favorable a light, with such eminent skill and ability, that I will not

attempt to say anything further upon the subject. But I notice in your horological school that it is an institution of special apprenticeship, and that it offers the means, not only to create good workmen, but to save to the young men who devote themselves to your industry, the serving of a long apprenticeship. The great advantages presented by your president are perfectly correct, at least they appear so to me. In this school the young pupils will encounter alike able masters and patient, devoted *savants* in their art, which is very often wanting in the workshop, for lack of time to teach the apprentice how to make piece by piece, and to teach him by degrees, all the different mysteries of this calling, at once so delicate and requiring so much ability. And further, the School of Horology, by offering to the young apprentices who attend it, a complete set of tools, remedies the insufficient and imperfect professional education which necessarily arises from the division of labor in a shop where the employer is compelled before all to occupy himself with the effective production of only remunerative work. Although this very division of labor has produced many advantages, economically speaking, it has also given rise to grave dangers, considering it in a professional light—the piece worker is not worth to-day what the more able one was formerly. He is reduced to a machine, and this reduction corresponds with the state of perfection of the machine itself, which requires, in order to be handled with skill, really capable workmen. Lastly, the Horological School, by retaining the apprentice amidst other young scholars of his age, who all learn and progress with him, suppresses laziness, apathy, and also dissipation and demoralization, which the youth too often acquires in the daily intercourse with workmen older than himself, who teach him nothing that he should learn, neither having the inclination nor the leisure, but they snub and sometimes corrupt him. The development of professional instructions is one of the grand duties which the Republic owes to its people. Remember that it is hardly a century since we have commenced by books, and scientific and philosophical treatises, to raise the mechanical arts from their low state of inferiority and unjust discredit, where it was left by a society blinded by prejudices. You will know that the history of the trades, and a description of the tools used in them, was made for the first time in the *Encyclopédie* of the eighteenth century. I wish to state right here that I found in the *Discours Préliminaire*, written by the illustrious *Alembert*, which may be regarded as the ornamental portico to the grand edifice, the following beautiful thought, which is, so to say, the foundation of all truly elevated professional instruction:

"Society, while justly honoring the grand talents who enlighten it, must not revile the hands by whom it is served."

We, gentlemen, think that not alone should we not revile the hands by which society is served, but it is our duty to refine them, to render them more supple and more delicate, more adroit and more skillful, that they may act as perfected, intelligent organs, possessing mental capacities more elevated and more pure. The hands by which society is served, are ours, gentlemen; they are the hands of a democracy. Our new social state is founded entirely upon labor, and in these modern times, with a few exceptions, among whom no one is permitted to rank himself at his own estimation, because no one may decree unto himself a patent for genius; it is labor that makes talent, as it is talent that makes personal merit, the sole distinction which may be admitted virtually by a society founded upon justice and equality. This is the reason why the question of education absorbs all others in our democracy; our adversaries are engaged in a struggle with us upon this ground; they well know what they do; they understand the full import, and know that if they could beat us, they would carry back the most decisive and fecund of victories.

Ladies and gentlemen, it is not from the political standpoint that enterprises of the nature of the one engaging our attention to-day should be viewed, but from the individual standpoint and its bearings upon the child, the youth, the man who thus receives useful, easy, and profitable lessons. Instruction, (and we will ever repeat it) is especially a means of civil and moral progress, because it teaches the

application, the passing into exercise, if I may say so, of the faculties with which nature has gifted us. A man who understands nothing, to whom his family and society have taught nothing, an *ignoramus*, either by his own or someone else's fault, ever remains in an inferior condition; he is like a slave awaiting his redemption. On the contrary, a man who works, who enlightens himself every day, most naturally elevates himself beyond his surroundings, and commensurate with his development he elevates his social condition. His mental energies increase and become firmer; he can control his mental force completely; he gives unto society all he is able to bestow; his worth augments; he mounts to eminence. Again, he who does not rise, simply falls lower; he never will remain in the same state. A fixed state, an immobility does not exist in nature. He must change. He must be himself, complete himself, educate himself, enrich himself with all the grand ideas, a knowledge of all the useful branches, in order to devote himself to the service of his fellow-men, to spread around him, and to render unto all, accrued and augmented, that capital they have loaned him, which has served us, and which now shall serve others.

This, my fellow citizens, is the true, the pure, the highest political and social fraternity; this is the grand and austere ideal which we have proposed to ourselves. Let us open schools; let us open temples—the temples of science, of progress, and of justice among all men. These temples surpass all others. They stand unrivalled and are as superior as the inviolate and august temple which each one carries within himself, at the bottom of the conscience of free man, of the citizen devoted to the Republic and the Fatherland, of the worshiper of the most noble and elevated of religions—the religion of the true, of the good, and of the beautiful in humanity. (Applause.)

The eloquent orator closed his address with words of cheer and encouragement to the pupils, stimulating them to renewed action and study. When finished, M. Lioret announced the list of victors. The Committee on Medals and Prizes, composed of the seven following gentlemen: Messrs. Brown, President; Requier, Vice President; Livret, Secretary; Margaine, Bergkammer, Redier and Cadot, members, have received the following contributions; there were 500 contestants, to whom sixty prizes were distributed, they having been contributed gratuitously as follows: Department of Agriculture and Commerce, 200 frs.; Department of Public Instruction and Fine Arts, 12 volumes; the Prefect of the Seine, 300 frs.; MM. Japy, Marié and Roux, 300 frs.; La Chambre Syndicale de l'Horlogerie, 300 frs.; Society for Encouragement and Propagation (of Books of Art, 2 volumes; Society for the Protection of Apprentices, 30 frs.; MM. Rodanet, 100 frs.; Dietta et Hour, 100 frs.; Carties, 50 frs.; Brown, 50 frs.; Herzog, 50 frs.; Margaine, 50 frs.; Bergkammer, 50 frs.; Dumoulin-neuf, 50 frs.; Paul Garnier, 50 frs.; Piéfort, 25 frs.; Champion, 25 frs.; Lioret, pivoting tool; Ballinan, universal lathe.

IT IS announced from Washington that a large number of unclaimed postal money orders, representing between one and two millions of dollars, remain in the New York Post Office, and it is proposed to have Congress pass a law converting this money into the Treasury. We have no doubt but the greater portion of these postal orders were sent to pay subscriptions to THE CIRCULAR, and we want them. The Government has no more right to them than it has to pick our pocket of an equal amount. Certainly, all these money orders belong to individuals; why does not the Government advertise the addresses on them and invite people to come forward, prove property, and pay charges? The Custom House and express companies are required to advertise unclaimed property, why should not the Post Office? We want our money, and object to having it turned into the Treasury.

An ancient and remarkable clock has been recently set up in the reading room of the municipal library of Rouen. A single winding keeps it running for fourteen months and some odd days. It was constructed in 1782, underwent alterations in 1816, was bought by Rouen for 1,000 francs in 1838, has recently been repaired and just set going.

Friction—Adhesion—Elasticity—Considered in their bearings upon Horology.

GENERAL RULES.
Conclusion.

We will finish our remarks on friction by giving a few extracts from the *Essai sur l'Horlogerie* by Berthoud. We would have wished to have given the whole of his excellent remarks on this important subject:

"Friction is diminished by: 1. Making the pivots of wheels which move with velocity as small as possible; 2. Making these wheels of as small a diameter and weight as is compatible with their solidity and functions they are called upon to perform; 3. Having the pivots very hard and their surfaces highly polished; 4. Choosing substances the most capable of resisting for the pivot holes. It would be best to let them revolve in diamonds if this jewel could be pierced successfully with a fine hole. (This operation being very delicate and the jewel rather costly, the horologist of to-day contents himself by using pierced rubies, which may be found in market at a moderate price.)* 5. Applying fatty and fluid substances, such as oil, to the pivot holes and other parts exposed to friction. This substance closes the pores and smooths the inequalities of the surfaces; 6. Giving to the motive power the necessary force to sustain the motion of the balance wheel, with a slight excess.

"It is very essential to state that it is not the absolute quantity of friction which principally should engage our attention, but rather its constant uniformity; because, although one machine may have less friction than another one, it is not by any means to be concluded that it is better, if it be so constructed that the friction of the other one is of a nature unchangeable by the motion of the machine; it being better to have the absolute quantity greater, but constant.

"It must be observed also, that matter can support only a certain weight, without that the pressing part enter into the cavities of the supporting part, and that the motion does not cause small particles to wear off. This quantity is in proportion to the hardness of the substance; diamond would resist without wear the strongest pressure, unless, however, that the rubbing surface be not increased proportionally by making use of bodies less hard. In regard to pivots, the length of their support should be increased as much as possible, in preference to their thickness, because the former does not augment the resistance to the motion, while the resistance by their thickness augments as their diameters.

"The thickness of pivots being given, their frictions are made constant by making them perfectly round, of the best cast steel, and well polished. The same care must be bestowed to the holes, by using well-hammered brass, and in proportioning the length of the pivots and holes to their diameters, (the length must be nearly twice the diameter).

"It is essential to equally divide the pressure upon each pivot, by which the latter may be kept smaller. The pinions must be placed in the middle of their arbors.

"Large oil sinks must be made at the pivot holes, to contain a good quantity of oil.

"The watch case must shut with simple closing, without spring; it must close hermetically, and not permit dust to enter.

"The best oil must be chosen, paying less attention to its consistency than ability of remaining in this condition.

"The same kind of oil should not be used for all frictions. For steeple clocks, a thick and fatty oil, which simply spreads on the lubricating parts without running, is best, because if a fluid oil were chosen, it would escape from the contacting surfaces, and they would attack each other very shortly, thus occasioning an early destruction. In one word, a fatty substance, which is employed for lubricating, must be in proportion to the pressure."

*NOTE BY EDITOR.—Ample experience has proven that notwithstanding the high expectations from the use of rubies, they are not altogether faultless. When examined under the microscope, they are found honeycombed, and the jagged edges contributed to wear the pivots. There is still room for improvement.

INFLUENCES DUE TO THE PRESENCE OF AIR.

Independently of its chemical action, susceptible of producing an alteration in the substances employed in horology, the air exerts another influence by its physical and mechanical actions on the moveable parts, as, for instance, upon the motion of the pendulum.

1. The air acts as a ponderous body, in diminishing the absolute weight of the bob by the weight of the volume of air displaced, and thus the position of the center of oscillation is disturbed. This position varies therefore with the changing in the density of the air.

2. It acts as a resistant to the motion, and the friction thus produced diminishes the extent of the arcs; it influences therefore the duration of the oscillations, by reason of the variation produced in the lengths of the pendulum, and in the amplitude of the arcs.

With regard to the balance-wheel of a watch, this last cause of disturbance does not exist if the spring is iso-chronous; but the resistance of the air will always have for effect: 1. To render the balance less weighty, and consequently accelerate its vibrations; 2. To become an obstacle to its motion, and to reduce consequently its amplitude.

THE ACTION OF AIR ON THE PENDULUM.

The influence relative to the variation of the density of the air by the temperature, that is to say, at the different weights which the air may have by a same volume and a same pressure, has been studied by Bessels; the scientist found that if a pendulum is well compensated for a change of temperature from $+25^{\circ}$ to -25° , or 50° in all, the change in the clock's rate will be from $+0.54$ sec. to -0.65 sec. in 24 hours, or 1.19 sec. in all. To remedy this cause of inequality, this celebrated astronomer proposes to let the compensation be somewhat feeble, thus, that in place of remaining exactly at the same length, the pendulum lengthens 1-6,400,000 of its length for each degree centigrade of temperature elevation.

Daniel Bernoulli calculated, on the other hand, (1717), the effect which a variation in the density of the air must produce by pressure, or the resistance of a mass of air contained in a same volume at a same temperature, under different barometrical heights, to reduce the amplitude of the pendulum arcs, and consequently cause the rate of the clock to vary, by reason of the smaller arcs described. "All else being equal," he says, "the arcs are reciprocally proportionate to the cube roots of the densities of the air. Now, the greatest density of the air stands to the smallest in our climate, about as 6 to 5; wherefore, the greater arc will be to the smaller, as the cube root of 6 is to that of 5, or as 1.062 is to 1.000. The greater arc, therefore, being $4^{\circ} 20'$, the smaller will be $4^{\circ} 5'$, and this difference amounts to nearly three-quarter seconds.

With regard to the influence of the friction of the air, the only experiments in our possession on the influence produced by the friction and the resistance of the air on the motion of the pendulum, by reason of the force, the weight, and the velocity of the bob, are those which F. Berthoud has made. We will state a few of the results which we extract from his *Essai*.

A pendulum beating seconds with a bob in the form of a sphere, 117 mm. in diameter, weighing 10,400 k., and a knife suspension, having been diverted 5° from the vertical and thereupon abandoned to itself, has oscillated for 13.22 hours, at the end of which time the oscillations of $10'$ amplitude were reduced to 1° .

In the same conditions, all things remaining equal, except a flat bob substituted in place of the sphere, the motion was prolonged to 14.52 hours.

The same bob, with a new suspension, executed with all care, oscillated for 29.46 hours, with total arcs 10° , which were successively reduced to $15'$ totality.

The arcs of 15 min. were reduced to 7 min. 30 sec. in eight hours' time.

With another bob of 151 mm. diameter, weighing 3,580 k., all things otherwise remaining equal, the duration has been only 17.6 hours, and 4 hours for the same smaller amplitudes.

With this same bob mounted on a rod only one-third of that of the seconds pendulum, the time of rate was 14.26 hours between the arcs of 10° and 15° .

A bob of the weight of 30.770 k., has not preserved its motion between 15 min. and 7 min. 30 sec. total arc extent, any longer than the bob of 10.400 k. already submitted to experiment, which should in a great measure prove the mode of suspension adopted, which was that of knife.

In another experiment, the knife having been treated with all possible care and considered perfect, the motion of the bob, of 10.400 k., was prolonged during more than eight days.

The only conclusion which may be drawn from these trials is that the air exerts a sensible influence to slacken the pendulum motion, and that this influence is by so much greater as the quantity of the motion is smaller, and the form given to the bob is more or less proper to cut through the air.

Conclusions.—One may, however, be completely at rest concerning the motion variations of the pendulum, which may originate as much from this cause as from the intervening changes in the density of the air, and no difficulty is experienced to day by making the bob cylinder-form, even with feeble weights with two kilograms, for instance. If any irregularity should result from it in the rate, it would make itself known by chronometers, whose balance is impelled by a small vibrating force, with a motion five or six times more rapid, most certainly two very unfavorable conditions. It may safely be accepted that this cause gives rise to errors only very insignificant to the rate, and the disturbance to the pendulum from this cause may be left out of the question.

ACTION OF THE AIR ON THE BALANCE WHEEL.

Urban Jürgensen has made some very interesting experiments, unhappily incomplete, on the action which the air exerts on the rate of chronometers; he has discovered thus that in causing a variation in the density of the air, measured by the height of the mercury in the barometer, from 0.76 m. to 0.11 m., in rarifying the air of the height of a column of mercury of 0.65 m., a chronometer, with arcs of vibration from 535° to 540° , vibrated over an extent of 655° to 660° , thus increasing its amplitude by 120° in rarified air.

A second one, having vibrating arcs from 400° to 405° , only increased 70° , and advanced 4.55 sec. in 24 hours.

A third one, with from 450° to 455° , augmented 55° , and retarded 0.7 sec. in 24 hours.

A fourth one, vibrating from 400° to 405° , augmented 50° , and retarded 3 sec. in 24 hours.

Lastly, a fifth one, with vibrating arcs from 420° to 425° , showed an advance of 1.2 sec. in 24 hours.

Thus the influence of the air has sometimes been greater, at other times been less, which variation is undoubtedly due to the imperfection of the isochronism of the springs, which have not been regulated to vibrate arcs so extended. It must also be stated that the balance was smaller in the second and fifth chronometers, the deviations of which were least.

The conditions accompanying these tests are very different from those which actually occur; the actual variations in the height of the barometer will only attain to about one-sixth of those in the experiments. The errors which therefore occurred should only be one-sixth of the actual ones, and aberrations so trifling are not tangible, and it is useless to draw them into account; and the results obtained by M. Jürgensen have happily been so small that it is barely possible to state with certainty, whether they originated from the change of atmosphere or other causes, and the fact which renders the latter supposition equally admissible is that the deviation has sometimes been more, sometimes less, and in any case has only amounted to a few fractions of a second, quantities so very small as almost to escape observation.

One can therefore be at ease about the much dreaded influences of the air on the rate of chronometers. Meanwhile, as such an effect

does exist, it is but right to pay attention to it, and to treasure the following precepts given by M. Jürgensen to completely destroy any baneful influences in the variation of the density of the air:

1. To regulate the balance spring in such a manner that for a diminution of 150° in the amplitude of its variations, the chronometer advances from five to six seconds in 24 hours.

2. Not to give a large diameter to the balance.

3. To shape the compensation and regulating masses thus that the screws are of a similar form given to the pendulum bob, to cut through the air with the least resistance.

4. Only to employ the most weighty metal for the compensating masses.

5. To sharpen the side faces of the balance shanks, to enable them to cut through the air.

ELASTICITY.

The elasticity of bodies is applied in horology to obtain three effects: 1. To draw back to a state of rest, certain pieces momentarily deflected by an accidental force; these are simple springs; 2. To sustain the vibratory motion of the balance; these are the balance springs; 3. To store up motive power which sets the train in motion; these are the mainsprings.

Substances of which horological springs are manufactured, are strongly hammered brass, tempered and non-tempered steel, pure and alloyed gold.

Steel possesses different degrees of elasticity, according to its preparation. Non-tempered, but hammered cold, it is sufficiently elastic, but bends when pushed beyond certain limits. Tempered and not annealed, it is more elastic; but in this state it is too vitreous to be employed with safety; but tempered and annealed, it possesses the highest possible degree of elasticity; this property is preserved in the same degree between all the shadings of annealing compared between the light blue (385°) and the grey white (315°); above or below these points it decreases rapidly.

Vibrations.—The vibrations of elastic blades are isochronous, at least in their small amplitudes; but it would be wrong to deduct herefrom that the large and small oscillations of balances provided with springs operate in equal time; the balance, with its spring, forms a complex system whose motions are not any more comparable to those of a simple elastic blade.

Friction.—Whatever the substance be of which the spring is made, its elastic vibration can only take place with a certain loss occasioned by the interior friction of the parts. A spring will never surrender all the force which it has received. But the loss is less so much as its elastic property is more pronounced; it is therefore of advantage to make use of a substance endowed with the highest possible degree of elasticity.

For the same substance, the elastic friction will be reduced with the thinness of the blade. It is of advantage, therefore, to keep the springs thin of blade, and to obtain the desired force by means of breadth, which may be increased without injury.

In the same blade, the loss of force by friction is relatively so much less as its vibration is less extended. Independent of the loss of force due to the play of elastic blades, there still exists another whose influence is very appreciable, it arises from the time used for stretching the spring. The reaction is in so much more brisk as the tension has been produced more rapidly. Thus, a spring will return more or less force in accordance with the time consumed in stretching it.

Influence of Heat.—Temperature also acts on springs, modifying their property; heat impairs their energy. The experiments of F. Berthoud, it is true, showed no difference in the extent of vibrations of the same spring, successively exposed to different degrees of heat; but recent trials, conducted with much care by M. Rodanet, have established that the energy of balance springs decreases and increases in exactly the same proportions as the temperature diminishes or augments.

Humidity and other causes also undoubtedly exert a certain influence on the elastic properties of bodies, but no data have been established on this subject. In the present state of our knowledge it is absolutely impossible to satisfactorily explain a number of facts, for instance, the breaking of steel springs.

Effects of tension.—Steel mainsprings lose their energy with time and use. After having been completely stretched and instantly permitted to return to its coils, the spring will not whatever possess the same power it had before. This power will return to it, however, by degrees, by remaining at rest. If the tension was prolonged, the spring would lose a part of its force, and never completely regain it. For this reason, a mainspring should be kept stretched for several days, before using it in a watch or chronometer, to cause it to lose its excess of force and simply retain its inherent energy.

A slow unrolling of the mainspring within the barrel is to be shunned, because experience teaches that its action becomes torpid, and varies in proportion as its velocity decreases. All things being equal, a chronometer gives a better rate when wound every day than one which has been constructed to go eight days. This appears to be due to adherences of the pivots within their holes.

Diamonds and Precious Stones.

Translated for the JEWELERS' CIRCULAR from the French *Diamonds et Pierres Précieuses* par Louis Daubigny, Professeur de Géologie et Minéralogie à la Faculté des Sciences de Marseille. 3me éd. Paris, 1874.

[Continued from Page 246.]

HISTORICAL SURVEY OF PRECIOUS STONES FROM THE MOST REMOTE TIMES OF ANTIQUITY TO THE ERA OF MODERN CHEMISTRY—NOTIONS ENTERTAINED BY THE ANCIENTS AND DURING THE MEDIEVAL AGE CONCERNING THEIR NATURE AND PROPERTIES.

DIAMONDS—CONTINUED.

It will be perceived that Tavernier's rule is defective. If a diamond of one karat is worth 529 frs., then one of two karats would be worth four times as much, or 2,116 frs., while its market value is only 2,017 frs.; one of three karats ought to be worth nine times as much, or 4,761 frs., while it only sells for 3,529 frs., and so forth. If the rule of Tavernier were followed, the diamond would rate far beyond its actual market value.

Another remarkable fact in connection with the price is, that 260 years ago it was absolutely the same as to-day, while an extraordinary fall occurred during the eighteenth century. But considering the value of the money between the former epoch and the present, the stone was much dearer during the commencement of the seventeenth century.

Large diamonds are very rare; lapidaries estimate that of ten thousand, barely one is found exceeding the weight of six karats.

The ancients could not even guess at the true nature of the diamond. To have some idea on this subject, it was necessary that the basis of modern chemistry be established, or that, at least the complex phenomenon of its combustion have received a true explanation.

The first important fact in relation to the nature of the diamond was established by Boyle, and dates to the middle of the seventeenth century. This English *savant* showed that under the influence of a strong heat, the diamond disappeared. A little later, in 1694, Cosmo III. Grand Duke of Tuscany, caused to be submitted, in Florence, a diamond to the test of fire, by employing as source of heat that of the sun concentrated upon it by a concave mirror. This experiment was directed by the two *savants* Averani, teacher of the Prince John Gaston, son of Cosmo, and Targioni, member of the *Academy del Cimento*.

The spectators soon beheld with stupefaction that the diamond diminished little by little, and at the end of a certain time, disappeared altogether. This experiment, repeated afterward at Vienna by another Grand Duke, Francis Stephen, of Lorraine, who afterward became Emperor of Austria under the name of Francis I, by replacing the sun's heat by the fire of a furnace, and obtained exactly

the same results. Nearly a century after the experiment at Florence, d'Arcet, Rouelle, Macquer, etc., submitted the diamond to the action of fire in France.

The 26th of July, 1771, three *savants* made an experiment in Paris, which became an event; a beautiful diamond furnished by a distinguished amateur, Godefroy de Villertraneuse, was burned in the laboratory of Macquer, and the strangeness of the fact was for a certain time the object of conversation in all ranks of society. The fact of its disappearing had to be accepted, but everyone cherished his own opinions—some said it had burned, become consumed, while others maintained that it had merely volatilized.

In the midst of the discussion appeared another individual, named Le Blanc, a celebrated jeweler of his time. Ignoring the experiments at Florence, Vienna, and Paris, he maintained that fire had no action on the diamond, resting these affirmations on his own personal experiment. He said he often had exposed diamonds to the action of a high temperature, to drive away certain specks and faults, and it had never caused the slightest deterioration on those submitted to its action. Being willing to support his assertions by facts, he took a diamond and surrounded it with a mixture of chalk and coal dust, then introduced it into a crucible, and exposed the whole to the action of a fire. At the end of three hours he ceased the experiment, and the interior of the crucible was examined. Only the little hollow, however, was found, which the diamond had occupied.

This experiment, executed in the laboratory of Rouelle, had attracted thither a great number of persons, some belonging to science, others being jewelers. The scientists were already persuaded by former experiments that the diamond disappeared under the action of the heat; and they attested the vanishing by shouts and clappings of hands, while Le Blanc "retired without his diamond, but not convinced."

Light now began to dawn on the question, but it still was far from being solved. Wherefore a scientist, the illustrious and unhappy Lavoisier, who afterward became one of the shining lights of modern chemistry, Cadet, and Macquer, submitted the question to new experiments, when a skilful lapidary, Maillard, appeared before them and sustained the theory of Le Blanc, as did his confrère, that fire did not exert any influence on the diamond.

"He came," as Lavoisier expresses himself, "with a zeal truly worthy of the recognition of scientists, and proposed to submit three diamonds which he had brought along, to the test proposed; he consented that they should be exposed to the most violent heat, for as long a time as was judged convenient, provided he was permitted, as had been Mr. Le Blanc, to enclose them after his manner."

This being granted, Maillard took the bowl of a pipe, placed therein his three diamonds, in the midst of charcoal powder closely pressed in, covered the pipe with an iron lid, and placed the whole within a crucible filled with chalk, and covered it with a silicious coating. The crucible was then submitted to a temperature of such a degree that at the end of four hours it was completely soft and on the point of running, when the fire was slackened.

We let Macquer himself state the result of the test: "Meanwhile Maillard, who had never seen his diamonds exposed to such a rude test, took all possible precautions to find them, and scrutinized with care the ashes and drops of molten matter which had fallen into the grate during the operation. I have not the least hesitation in acknowledging that I fully expected the diamonds to be destroyed, * * * and seeing M. Maillard draw the cinders together, I remarked jokingly that if he desired to find them, he had better hunt for them in the soot of the chimney. But I had anticipated my triumph. Upon cooling, he found the pipe bowl unscathed, the charcoal powder as black as when first put in, and at last we perceived the three diamonds as well preserved as they had been before the test. The only difference was that they were tintured blackish, which was removed by the wheel, and they became as bright and brilliant as ever."

Analogous tests were made in different parts of Europe, sometimes with the one, sometimes with the other result. The facts remained a problem until the moment that, the principal phenomena of combustion having been established, it was recognized that the diamond disappeared whenever it was heated in the presence of air, but completely resisted the attempt, when with aid of a body like powdered charcoal, lime, chalk, etc., it had been withdrawn from the action of the air, when being heated. The question had arrived at such a point that it did not take long until it was definitely solved. Two of the creators of chemistry, Lavoisier in France, and Humphrey Davy in England, soon furnished the solution.

"What is the diamond? It is the most precious and dearest thing in the world. What is carbon? The most common material known; one that not only exists in vast quantities within the earth, but at the same time plants and trees of all kinds possess it in inconceivable quantities. Silver can hardly pay for the diamond; for if we imagine a diamond of the weight of a twenty-five-franc piece, it would weigh about 125 karats, and be worth at least 4,000,000 of francs, while a like weight of carbon, even when paying with the smallest copper pieces, would possess no appreciable value. Still, the diamond and carbon are identical—diamond is simply crystallized carbon." (M. Babinet.)

Everyone knows the pungent gas set free by fermenting fluids—cider, beer, wine, etc., and which is artificially introduced into Seltzer water, etc.; it is formed by the combination of carbon with one of the elements of air (oxygen), and has been called carbonic acid by chemists. This gas is produced whenever charcoal or substances are burned in contact with air; but not the least trace of it is ever found if the substance burned does not contain carbon.

When this important fact had been established, it became very easy to ascertain whether the diamond possessed carbon, and even whether it was its principal constituent.

The first part of the question was solved by Lavoisier, by aid of an experiment as given below.

A bell glass filled with oxygen was reversed in a basin with mercury; a cupel placed at the end of a small column received the diamond, and a burning-glass concentrated the rays of the sun upon it.

The diamond disappeared, and it was proven that the glass which at the beginning had contained no trace of carbonic acid, now contained a great quantity after the disappearance of the diamond; whence it was deduced that the diamond, among other ingredients, also contained carbon as one of its elements.

Davy went still further. In experiments analogous to the preceding, he demonstrated that the combustion of the diamond in oxygen produced carbonic acid only; the diamond, therefore, must be composed of carbon only, and nothing else.

Doubts still lingered upon this last point, but they disappeared completely since the publication of the great work of MM. Dumas and Stass, upon the equivalent of carbon.

These two savants burned in their experiments a great many diamonds, but they corrected an error the maintenance of which would have been a veritable calamity to science; the important results obtained by these gentlemen in their researches, completely justified them in the use of so exceptional a fuel.

It is very probable that an absolutely pure diamond consists exclusively of carbon; such are extremely rare, however.

"All the diamonds we have burned have left a residue, a cinder, if we may call it so, sometimes in the form of a reddish-yellow color, again in straw-colored parcels, and crystalline, or in fragments, colorless and crystalline. This portion of the diamond, not carbon, is not matter adhering to the outside simply. We have encountered the same kind of residue by combustions made of very large crystal, well washed and boiled for a long time with nitro muriatic acid. Whence follows that this mineral matter appertains to the crystal itself." (MM. Dumas and Stass.)

They found that the residues of the combustion of a diamond rai-

ried from 1,500 to 1,2,000 of the weight of the diamond consumed.

The common belief was that a diamond could only be consumed with great difficulty, which is another error corrected by these gentlemen, who found that it burns quite readily in oxygen, with greater facility, in fact, than certain carbons which collect in high furnaces during the treatment of mineral iron.

Another gentleman, M. Morren, one of the most able and learned physicians of France, senior of the Faculty of Sciences at Marseilles, also demonstrated this fact by one of the most fascinating experiments known to chemistry.

He secured the upper end of a platinum wire in a cork, bent up the lower end and fastened a little receptacle for the diamond to be burned upon it. A vial filled with oxygen was at hand, and by means of a blowpipe he raised the temperature of the diamond to a white heat, as well as its receptacle, and then quickly plunged it into the vial. The diamond inflamed thereupon, and continued to burn with a brightness infinitely more vivid than could have been obtained from any other kind of carbon.

M. Morren also proved that the diamond burns in layers, because if the combustion is stopped at any time, the part unconsumed has not undergone the least change, and it shows all of its angles and planes as formerly. This is an important point, as it appears to exclude all idea of fusing the diamond.

EXCEPTIONAL DIAMONDS.

We will next review the most celebrated diamonds, give their exact dimensions, and treat of their cutting.

Asia is the home of precious stones, and in particular of that of the diamonds. It has furnished, as we will learn in this chapter, the majority of the diamonds exceeding the average size.

We commence the description of celebrated ones by citing the description of Tavernier of those of the Grand Mogul.

"The first stone that Akel-Kau placed into my hand was a great diamond, a rose, very high on one side. It has a small notch on one of its edges, and a slight flaw within. It is of good water, and weighs 280 karats. When Mirginda, who betrayed the Grand Mogul, his master, made a present of this stone to Cha-Gehan, to whom he attached himself, it was uncut, and weighed 787½ karats, but had several flaws. If this stone had been in Europe, it would have been treated in a different manner, because it would have been split into several pieces, and would have remained heavier. A Venetian by the name of Hortensio Borghis cut it, but he was badly recompensed, because, when it was cut, he was accused with having spoiled the diamond, and in place of receiving payment for his work, he was compelled to pay ten thousand rupees to the king, who would have taken still more if the cutter had possessed more. If Mr. Hortensio Borghis had well understood his profession, he might have taken several nice pieces, but he was not a skilful cutter.

"After having fully examined this beautiful stone, and returned it to the keeping of Akel-Kau, he exhibited another one to me, of a very fine form and excellent water, also three other table-cut diamonds, two of which were clear, and one contained little black spots. Each one weighed from 48 to 50 karats, the first one 54½ karats. He next showed me a trinket of twelve diamonds, each one weighing from 13 to 14 karats, and all roses. In the midst was a heart-shaped rose, of good water, with three little flaws. This one weighed from 30 to 35 karats."

The largest diamond of the Mogul has the form of half an egg, and is estimated at 12,000,000 francs. It appears that the celebrated Nadir Shah has seized it, and that it is in Persia.

Another beautiful diamond, called Agrab, is still the subject of conversation, it weighed in its natural state 645½ karats. Tavernier estimated it at 25,000,000 francs.

One of the most celebrated diamonds is that of the Rajah of Matum, of Borneo. Uncut, it weighs 318 karats. It is pear-shaped.

This diamond, for the rajah and the population of the country, is a species of palladium, ruling and protecting the empire. The water into which it has been dipped is an efficacious remedy against

all manner of sickness and disease. Hence will be seen the price attached to this stone. In 1820, Mr. Stuart was sent by the governor, who resided in Batavia, to the rajah, offering him, in exchange for his diamond, \$150,000, two brigas-of-war, well armed, and a large quantity of powder and munition of all kinds. The rajah refused.

East India has furnished still another large diamond, in possession of the King of Golconda, the famous Nizam, which, uncut, weighed 340 karats, and was estimated 5,000,000 francs.

France.—One of the most celebrated diamonds in the world belongs to France, called the Regent, which, together with its large size, unites in an eminent degree all the qualities of a first-class stone. It was found in the mine of Partout, forty-nine leagues south of Golconda, and weighed uncut 410 karats. Two years were consumed in cutting it, at a cost of 125,000 francs. It was thus reduced to 136½ karats; but the cutting is perfect.

It is stated that the rough diamond was purchased at Madras by the grandfather of William Pitt, at that time commander of Fort St. George, who paid for it 312,500 francs, and that, in 1717, it was bought for the sum of 3,375,000 francs by the duke of Orleans, regent of France during the minority of Louis XV.

M. Saint-Simon, however, gives an entirely different version of the purchase. He says: "By an extremely rare occurrence, an employé at the diamond mines of the Grand Mogul, found the means of stealing a stone of a prodigious size. As a culmination of his fortune, he was enabled to embark and arrive in Europe with it. He showed it to several princes, whose wealth it surpassed, and at last, took it to England, whose king admired it very much, but who hesitated about buying it. An exact model of crystal was made of it, and the man, diamond, and model were sent to Law, who offered it to the regent for the king." * * *

The state of the French finances would not admit of the purchase, but Saint-Simon used persuasion by representing that the stone was without rival in Europe, and was a worthy diadem in the crown of France, and that its acquisition would shed lustre on the regency of the duke, who consented finally, and the diamond was bought for 2,000,000 francs, the seller also receiving the cuttings, with interest on the price until the whole was paid.

Apart from its great commercial and artistic value the Regent has individually a very dramatic history.

"The Regent," says M. Babinet, "before the robbery of the crown diamonds, had the honor of being presented to the people, or, at least, to the populace of the time, in the following manner: A little room had been fixed in such a manner as to permit the passers to enter with facility, and to demand, in the name of the sovereign people, to see and touch the beautiful diamond of the ex-tyrant. Thereupon, the national diamond was passed through a little wicket, and handed to the citizen or citizeness in rags, enclosed within a solid steel claw, with an iron chain fixed within the opening through which it was presented to the visitor. Two policemen, to the right and left, fixed their lynx eyes upon the momentary possessor of this marvel of Golconda, who, after having had in his hand a value estimated at 12,000,000 francs in the inventory of the crown diamonds, resumed at the door his ash bar or his hook, and continued to explore the sweepings in the hod barrels. I have had several invitations to attend these visits to the crown diamonds, but have never been present."

The Regent passed through many adventures—it was pawned to the Batavian government, stolen by robbers, who were released subsequently. An anonymous letter afterward revealed the hiding-place of the stone, etc.

Another handsome diamond is the Imperatrice Eugenia, cut as a brilliant, and weighing 51 karats.

A third very celebrated diamond, having for a long time belonged to France, is the Sancy. A difference of opinion exists about this jewel. Some say that it was brought from Constantinople by an ambassador of that name, who paid for it 600,000 francs, others,

that it ornamented the helmet of Charles the Bold, who lost it at the battle of Cranson. Found by a Swiss soldier, it was sold for two francs to a monk who again sold it for three. It disappeared afterward, but in 1589, it was a part of the jewels of King Anthony of Portugal, who pledged it to De Sancy, treasurer of the King of France, who finally acquired it for the sum of 100,000 livres (coinage of Tours). It remained a long time in his family, of which Henry III. borrowed it to pledge it for the raising of a body of Swiss troops, but the servant charged with carrying it to the king was attacked, killed, and the diamond was deemed lost. By dint of searching, it was finally discovered that the servant had been attacked in the forest of Dole, and that, by the charity of the curate, the body had been interred in the cemetery of the village. "My diamond is not lost, then," said the Baron de Sancy, and, indeed, it was found in the stomach of the faithful, unhappy servant, who had swallowed it when he saw himself overpowered. According to the inventory of 1791, the Sancy weighed 33¾ karats. Beside its considerable weight, it possesses another specific interest for us, in its cutting, and we will recur to it in another chapter.

It disappeared again in 1792, and after several perigrinations, it has to-day arrived in Russia. It is estimated at 1,000,000 francs, but, according to Helphen, who is a judge of these things, the price is exaggerated.

According to an estimate made in 1791 by a committee of jewelers, France possessed in 1774, 7,482 diamonds, and this entire magnificent collection was stolen in 1792. Napoleon I. caused the whole of Europe to be ransacked in search of the jewels, and with success, because an inventory of 1810 mentions a considerable number of diamonds, with a total value even superior to that of 1792. A new inventory of 1832 gives the entire number at 64,812 stones, with a total value of 20,900,260 francs, while that of 1812 only gives it at 17,000,000.

Since then, the French collection of diamonds has grown; it has received in particular the addition of the magnificent Imperatrice Eugenia, of 51 karats.

To be Continued.

Obituary

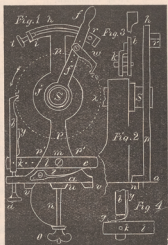
JAMES E. CALDWELL.

THE death of James Emmett Caldwell, a well-known jeweler of Philadelphia, occurred at his residence in that city in the early part of last month. He was born August 15, 1813, at Poughkeepsie, in this state. At an early age he was apprenticed to P. P. Hayes, a silversmith in Philadelphia, with whom he thoroughly mastered the trade. After completing his apprenticeship, the deceased was employed for a time in New York, but soon returned to Philadelphia, and engaged in business for himself in company with Mr. Bennett. The firm underwent several changes in name, eventually being known as James E. Caldwell & Co. The firm occupied a large and commodious store at No. 902 Chestnut street. In 1868 this store was burned, two clerks perishing in the flames, but the energy of Mr. Caldwell soon had the building replaced by another better suited to his business, and from that time forward the store of the firm formed one of the great commercial attractions of Philadelphia. Mr. Caldwell was an upright, honorable man, the strictest integrity characterizing his every transaction. He was a man of great energy and public spirit, his name being identified with many public and private enterprises. He was long a director of the Farmers' and Merchants' Bank, a valued member of the Board of Trade, a Director of the Union League, and at the time of his death was a Director of the Delaware Mutual Safety Insurance Company and Accounting Warden in Calvary P. E. Church of Germantown. Exceedingly genial in his disposition, he enjoyed the warm friendship of very many of Philadelphia's most prominent citizens. He leaves a widow and six children and an extended circle of valued friends to mourn his loss.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

I LEFT the reader in my last article with the compound wheel made and on the same arbor with the wheel of 96 teeth. Our next business is to transfer the divisions in the shape of teeth to the compound wheel. The arrangement for doing this is shown at Fig. 1. This plan is very simple and rapid, and can with slight modifications be applied to any live spindle lathe—these modifications refer to the manner of attaching it to the lathe. The parts now described the reader will bear in mind are not temporary, but a permanent part of his cutting engine, and will consequently have to be nicely made. The main features of this affair is best shown by looking at it in the direction of the axis of the lathe, such a view is given at Fig. 1. The principal piece would be best made of cast brass, but it can be made of No. 8 or 10 sheet brass; such a piece of sheet brass should be $2\frac{1}{2} \times 5$ inches when you commence, then sawn and filed into shape. By far the best way, however, is to make a wood pattern and have it cast in hard red brass. Most carpenters and cabinet makers know something of pattern making for casting from, and would make you a pattern at small cost. Hard wood like cherry or maple makes the best patterns; and they should be varnished with shellac dissolved in alcohol. A pattern sent by mail to Miller & Keeps, 712 Cherry street, Philadelphia, Pa., saying you desire the casting in *hard red brass, dry sand work*. Ask the cost, and you can remit for the casting and return postage; put the pattern in a strong paper box with two rubber bands around it—write or paste the address on the outside (it is, I suppose, an unnecessary caution) but put no writing or instruction inside; but in a letter sent at the same time ask the cost (it will be at the rate of forty-five cents per pound), and when you remit for the casting enclose a piece of paper with your own name and address to paste over the address by which it was sent—postage one cent an ounce. There are plenty of other brass foundries, but I only give one; they are reliable—do good, first-class work at reasonable prices. The cut is about $\frac{1}{4}$ size, but as the different lathes vary in size, it will only be the idea I can convey. Fig. 2 is a view at right angles to the axis of the lathe, and from the front. This shows an edge view of the piece I recommended to have cast—all the accessories are supposed to be removed. At a , t is piece turns



at a right angle, to give a broad, firm bearing on the bed of the lathe. If yours is a Swiss lathe, a socket must be substituted. The screw and nut o , n , Figs. 1 and 2, screws it in position. At x , Fig. 1, is seen the end of the lathe spindle; this protrudes through a collar in the piece p . This piece commences at the base a , rises with curved shoulders at p' , expands into the collar j , extends above the socket in the bar p , and terminates in the slotted segment h . The piece f has a socket like the socket to the regulator of an English lever (one which turns in the plate) which goes into the collar j , and extends upward to the handle f . At one end of the segment h is a stud i . The piece f , or lever as it might be called, it will be seen, can turn on its socket in the collar j ; the stud i serves to stop this lever when moved in one direction and a movable stud r , with a screw and washer stops it in the other. It will now be seen that the lever f can be moved

back and forth between the studs i and r , and that the length of arc of motion can be changed by shifting the stud r , working in the slot of the segment h . At w is shown a click attached to f with a screw; this click works free and falls by its own weight into the teeth of the spacing wheel x , shown in dotted outline. Suppose this spacing wheel x , has 96 teeth, and we wish to cut a wheel of 24 teeth; we set the loose stud r so that the click w will carry the wheel x forward four teeth, every time the lever f is moved back and forth. The click b serves to hold the wheel x while the lever f is drawn back. There is a constant tendency of the wheel x to turn back in the direction of the arrow, so that the click w is arranged to always carry the wheel x a little too far, but it retrogrades against b , so the spaces are always exactly a given number of teeth of x . The screw t is to allow the lever f to be drawn back far enough to freely engage a tooth; the screw t should be of such length as to control f , a trifle more than the space of a tooth in any spacing wheel which you may use. The click b is also adjustable by the screw d ; this adjustment should also have the scope of over one tooth of the spacing wheel. The use of this adjustment is to enable you to restore work which slipped, or been taken out before being perfected. The lever f has holes above and below the screw which holds the click w , to accommodate a change in the size of spacing wheel (x). The click b is attached to a bar l , which works on a screw at m ; this screw is tipped into the piece p ; this screw should be carefully made and work without side-shake in the bar l . The bar l is pierced with several holes, so that the click b can be advanced when using smaller spacing wheels; under the bar l at c , is a spring x , which keeps the bar l pressed against the adjusting screw d . At Fig. 3 is shown a view of the click b , seen in the same direction as Fig. 2; it will be seen that it is made double, and goes astride the bar l ; k is a taper pin; let the pin turn in the bar l . At y is shown a spring which keeps the click b pressed into the teeth of the spacing wheel x . Fig. 4 shows a vertical section of the click b , bar l , and spring y ; this section is on a plane at right angles to the axis of the lathe. It will be seen that the position of the spring y is somewhat peculiar, being screwed on the inside of the click b , passes through the fork above the bar l , and only touches it (the bar l) on the outside at g . At r , Fig. 1, is shown two pieces; these go on each side of the lathe-bed, and serve as guides for instantly placing this attachment. If your lathe lies up from the slot in the center, one piece, as shown at x , will answer. When using this attachment, put your hand on the largest driving pulley of your lathe spindle, and hang a weight on one of the arms of the foot wheel, so as to keep the tooth engaged firmly pressed against the click b ; let the band be quite tight, and the weight as much as it will bear and not slip the band—keep your foot off the treadle. The suggested method of keeping the spacing which pressed against the click b , is not imperative. A friend of mine used a string and an elastic rubber band; the string is wound three or four times around one of the pulleys, so as not to slip, and the rubber so arranged by fastening to the back of the bench that it is gradually drawn out as the lathe revolves. It is evident that now we have an arrangement by which, when the attachment just described is in place, that the arbor d , scribed in our last number, with the two wheels on it, can be screwed into the spindle of your lathe, and click w will fall into the teeth of the 96-tooth wheel, and the lever f can be set so as to carry but one tooth forward, which the click b will hold until a tooth is cut in the compound wheel we described in our last article. Care should be taken to form the end of the click b so that it falls too, and engages with the base of the tooth to be held; the idea will be understood by inspection of Fig. 1. With the attachment just described and an arrangement for cutting teeth, we could cut a wheel of any size less than $3\frac{1}{2}$ inches, if put where the compound wheel is placed. A simple form of chuck for holding the spacing wheel and also wheels to be cut, will subsequently be described. The next article will describe the mechanism for cutting the tooth, which is perfect, yet simple—cuts gear of almost all known kinds: bevel gear, spur gear, end ratchet gear, such as the shifting pin of stem winds, screw gear; and as for rapidity—after a wheel to be cut is in the lathe and the cutter set to the right depth, a wheel of 80 teeth should be cut in eight or ten minutes.

Guide for Watchmakers' Apprentices.

BY HERMANN SIEVERT.

[Continued from page 242.]

If possible, only temper the pallets, for fear of the anchor warping, but they must be made very hard. Others prefer to temper the entire anchor, and dip it, back foremost into water, as it is said to thus warp less. Of course, the new anchor suits for no other than the draughted center distance.

I will make a final remark upon a very useful shape which the entrance pallet always should have. This pallet is straight in most French clocks, which is objectionable for several reasons. Enabled by a small excess of power which a clock always must have, the pendulum will continue its swing for a short distance beyond the drop of the tooth. By this motion, called the arc of completion, the scapewheel is pressed back by the anchor pallets. This is called the *recoil* of the wheel. Of course, this recoil will be greater on a straight entrance than at the exit pallet, provided that the lifting, that is the inclination of the pallet, is equal on both arms. Desirable as such an equality is, an unequal recoil always operates disturbingly upon the clock's rate. To remove this defect, retaining at the same time the obtained advantage of the equal inclination of the pallets, we give, from the place forward where the tooth engages, *i. e.*, where the recoil begins, a rounded form to the entrance pallet, as is given in the dotted lines in Fig. 1, and so much that the recoil is equalized on both arms.

The effects of the *lifting pins* upon the hammer lever is best compared with the driving of a pinion leaf, only that in this instance not so much depends upon an equable motion as upon the most complete consumption of power and upon the least possible amount of friction. Accordingly, the engagement best commences upon the line of centers, and the arrangement sketched in No. 2 besides offers the advantage, that by continued lifting, which demands an increasing consumption of power, owing to the augmenting elasticity of a counterworking spring, the lifting pins act as constantly lengthening levers.

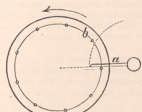


Fig. 2.

The hammer is impelled by a spring against the sounding body. This spring operates the better, the less its difference of power is between the commencement and the end of the lifting. If the power of the spring increases to any amount at the end of the lifting, it demands a greater exertion of the train, which benefits the striking operation of the hammer in only a trifling degree. It occasions moreover a great loss of power if the hammer be not immovably connected with its arbor. To permit the bell or spring to sound free, the hammer must be at some distance from it, and only touch it by virtue of the spring-like motion of its handle or support. The tone will be far clearer, especially with a bell, if a spring is made use of for support, instead of an unelastic pin.

To prevent the rapid running down of the lifting-pin wheel, generally two more wheels follow it, the last one of which always drives a pinion with fly. One of these wheels carries a pin in its wheel rim which runs against the *stop*, and thus discontinues the motion of the striking-works. If this pin is on the second wheel which engages immediately in the fly pinion, a disc is placed upon the arbor of the first wheel with one or two notches, the *heart disc*, which raises the

stop until the hammer lever has fallen from the lifting pin. During one lifting of the hammer the heart disc, together with the *heart wheel*, makes one, or with two notches one-half, revolution, so that after each strike the stop falls into a notch, and thus catches the pin of the second wheel. For a sufficient security of this procedure, the wheels must be placed together in such a manner that at the commencement of the stoppage the pin is still one-fourth circumference from the starting plane.

Only one stroke, however, would occur in this manner; therefore, another special wheel becomes necessary, the *locking wheel*, or *locking washer*, which turns once every twelve hours around its axis. All the hours are marked upon it by suitable notches, and it is therefore, by hour-striking clocks, divided into 78, by those of one-half hour into 96, equal parts. These parts are counted off according to the requisite number of strokes, and the notches are cut upon the rounding and cutting machine. The stop can consequently not fall any deeper than is permitted by the notch in the locking wheel. The entrance of the stop must occur without hindrance, and the notch must be corresponding broad; on the other hand, the stopping at a wrong time must securely be guarded against. Should the division of the locking wheel be inexact, and the fall not always occur in the middle of the notch, it must be corrected, but carefully, so as not to increase the error.

If the starting pin, as is the case in mantle-piece clocks, is on the first wheel following upon the lifting-pin wheel, the heart washer is unnecessary. The wheel turns once at each lifting of the stop, and the lifting-pin wheel advances by one lifting pin. The starting, as also by the preceding striking-works, must occur especially on the tangent. The starting plane must be straight, or at least in the

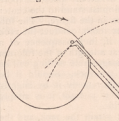


Fig. 3.

shape of a segment, struck from the center point of the stop. In such a case, the wheel neither will press the stop up, nor need it go back with the unlocking of the stop. The latter may, especially if the face is somewhat rough, occasion the standing still of the clock. The stop lever is filed out somewhat behind the starting plane, to prevent it from falling upon the pin, after an unlocking, and retain it by friction.

While the locking wheel is moved by a pinion in some clocks, and must therefore be toothed, it is placed, in mantle clocks upon the protruding square pivot of the *intermediate wheel*, and is without teeth. Suitable marks are made on the pivots and on the lining of the locking washer, to indicate how it is to be placed. It is necessary, on account of greater security, that the stop be raised entirely, before the pin of the locking wheel has made a revolution with it. This thus must have to accomplish at least one-fifth or one-fourth of its revolution before the falling of the stop occurs. It is unworkmanlike to bend the stop in mantlepiece clocks; any correction must be made by unscrewing the bridge from the lifting-pin wheel, and the position of wheel teeth and pinion leaves must be changed until the stop is right.

The lever contrivance by which the clock work raises the drop is called the *unlocking*. To prevent the striking-work from running down when the drop is sufficiently raised, a pin of the last wheel is made to run against a plane in the unlocking, and only when this has fallen from the unlocking pin of the canon pinion or minute wheel, can the striking part continue its further operation. This stopping of the striking part by the unlocking takes place best at a

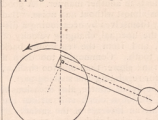


Fig. 4.

tangent (Fig. 4), but by a somewhat inclined plane, so that the unlocking, which only drops back by its own weight, may not be retained by the pin. The starting plane is bounded by a sharp edge, to prevent the starting pin, by an accidental standing still of the striking work, from running upon the upper edge of the mentioned piece and wedge the unlocking.

The striking part is composed thus that the starting pin, after finishing striking, stands at the opposite side of the starting plane. After the starting, the hammer lever must not yet be touched by the lifting pin, especially when, as is the case in 8-day clocks, the power is contracted, so that the striking works may be set in motion without any hindrance.

The stop is often pressed down by a spring, for increased security, which must be very weak, however, so as to neither burthen the unlocking nor the motion of the striking work.

Repeating striking works are a special kind. They have no locking wheel; the number of strokes is determined by a wheel with a circumference twelve times graded down, the hour notches, which is moved by a canon pinion, and sometimes is placed directly upon the hour canon. Another very important part of this striking work is the rack, resembling a piece of wheel with only one arm. It is put into motion by the tooth of the fulcrum, *a*, Fig. 5, retained by the

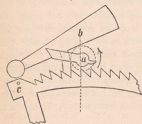


Fig. 5.

The fulcrum must drop far enough each time to prevent the fulcrum tooth from remaining hanging on the point of the preceding one; the stop may, for greater security, reach without risk beyond the following tooth point. When the stop rests within the space, the tooth intended to be seized by the fulcrum wheel must stand to the center in the manner indicated by the dotted line in the figure. The fulcrum will then, by a sufficient length of its tooth, conduct the rack as far as is necessary for security. But if, in consequence of a reversed position of the rack, or by too great a length of the fulcrum tooth, the former is conducted too far, a disagreeable rattling will be created by the repeated jumping back of the rack. Should it be occasioned by a faulty position of the rack, remedy it by slightly lengthening the stop. If, however, the position is right, it is simply necessary to shorten the fulcrum tooth a trifle.

It sometimes occurs that the stop cannot retain the rack, and the clock continues to strike. This is occasioned either by a faulty form of the tooth or of the stop. The former must be ratchet-shaped, their attacking face must concur with the radius. The stop must be circular at its operating face, struck from its motion center. No jumping back of the rack will occur if both conditions are complied with.

The first somewhat shorter tooth of the rack facilitates the striking of the quarters. The unlocking will raise the stop only sufficiently high to enable the rack to drop by the one tooth.

The hour notches must be worked very exact, and go very secure; it should especially give rise to no error in the position of the rack by side shake. Not to interfere with the hour work, it should not consume much power.

The fly regulates the motion of the striking work only by its resistance to the air, and the extent of its surface can simply be considered. It should be as light as possible. To prevent a possible damage to the teeth by the fly, at a sudden stopping of the striking part, it moves with a soft friction upon its arbor, which thus enables it to continue on its course, but it should be strong enough at the same time to prevent its sliding during the striking.

Although faulty depthings from the pin-wheel forward do not easily occasion the standing still of the train, since they are simply a running work without actual transmitting power; nevertheless, had toothings operate with injurious effects in another manner. A good depthing with correct leaf-form runs almost without any noise. Bad toothings in the striking part betray themselves by occasioning a disagreeable noise, which arises from the unequal, changing velocity of circumference of tooth and leaf, and from the remaining back and dropping after of the wheel tooth. Commonly, too deep a depthing makes more noise and runs slower than one too shallow, and this fact is often made use of for regulating the striking part.

A greater or smaller surface of the fly, of course, also occasions a slower or an accelerated striking. But if a clock still strikes too quick, and the room does not permit an increase of the surfaces of the fly, it becomes necessary to insert a wheel with more teeth or a pinion with less leaves.

(To be continued.)

Business Notes.

David C. Dodd, Jr., has opened an office at 694 Broadway.

Mr. Y. Harsch, brother of F. J. Harsch, of Vincennes, Ind., has opened a jewelry store in Seymour, Ind.

Ramsate & Velders have formed a co-partnership for the purpose of conducting a diamond cutting and polishing business.

Messrs. Wulff & Worms, 43 Park Place, present an attractive line of novelties in art patterns and Bisque figures, never before offered in this country.

J. G. Kapp, of Toledo, has recently made an important improvement in his store with a view to introducing a department for optical and musical goods.

H. C. Graffe, of the late firm of Meyers & Graffe, Fort Wayne, Ind., has changed and beautified the front of his building, adding greatly to its attractiveness.

Heller & Bardel are making for a special order a magnificent diamond necklace composed of twenty-eight fine stones. When finished it will cost from \$40,000 to \$45,000.

Mr. Alfred H. Smith, of Alfred H. Smith & Co., is expected to return from Europe about the 9th inst. Mr. Smith has been abroad some months buying goods for his house in New York.

H. Muhr's Sons of Philadelphia, have recently gone into the manufacture of filled watch cases, known as the "Crown improved filled case." The firm guarantee them to wear 25 years.

C. B. Hubbard's jewelry store at Pulaski, N. Y., was destroyed by fire Oct. 6. Loss estimated at \$1,000, partially insured. A. N. Davis also suffered a loss of \$500, but fortunately, was fully insured.

Messrs. Wilkening Bros., of Cincinnati, Ohio, have introduced into bangle rings and bracelets an admirable likeness of the late President, James A. Garfield. These medallions are made in gold and silver and are struck up from dies.

The Executive Committee of the Jewelers' Guild of the United States have printed a standard price list for bench work, copies of which will be sent to legitimate dealers on receipt of five cents. Address Joseph Baker, Rock Island, Ill.

D. L. Safford's new reference book of the jewelry trade is highly spoken of by the trade. Its accuracy and thoroughness of compilation is vouched for by many of our best houses, whose testimony appears elsewhere in our advertising columns.

Messrs. Rogers & Bro. have recently issued a very neat and attractive catalogue of their wares, showing many new and beautiful designs that cannot fail to attract attention. The work is admirably conceived and artistically printed, and will be of great convenience to buyers.

Keller & Deconmeyer have secured letters patent for a series of raised gold decorations, especially designed for embellishing watch cases. These designs are particularly appropriate for the various trades and professions, and are executed in the highest style of the goldsmiths' art.

Traitel Bros.' gold and silver solutions for coloring and silver plating without the use of a battery, are a great convenience, and indispensable to country dealers, who are frequently called upon to do work of this character. These solutions are guaranteed to do good and thorough work, and may be implicitly relied upon.

Wm. M. Fisher & Co.'s interchangeable combination necklace is one of the novelties of the season, and is rapidly growing in popular favor. This combination necklace can be readily detached and worn in a variety of forms, each making a separate and distinct article of personal adornment, or in combination, at the pleasure of the wearer's sweet will.

Advices from Adelaide, South Australia, announce that a gold medal has been awarded to Leroy W. Fairchild, for the artistic excellence of gold pens, pencil cases, etc., exhibited at the recent Exposition by a local dealer in Adelaide. In view of the fact that the goods were not especially designed for the Exhibition, but were taken from the stock of a customer, this honor is all the more gratifying.

Kahn, Hanover & Co. are sole agents for a new and instructive scientific toy for young people, called the pocket camera. It reproduces on a ground glass surface, scenery, trees, animals, portraits from life, and, in fact, everything that passes before it. It can also be used by travelers, and made the means of presenting to their view a perfect panorama of scenery, without the trouble of straining head and eyes to obtain glimpses of it. It is very ingenious, and can be made the means of whiling away many a pleasant hour.

What is Going On in the Trade.

Bangle bracelets are still popular.

Tortoise shell glass is a novelty in glass bowls, vases and bottles. Many new designs in Bracelets will be offered during the holidays. English porcelain is much in favor at present for ornamental pieces.

Cameos made from Australian opals are very attractive and very expensive.

Turquoises are again fashionable, and are extensively used in lace pins, earrings, etc.

Gold and silver jewelry, in combination, is rapidly growing into popularity in England.

Samuel Strauss, a well-known jeweler of this city, died Oct. 24, after a brief but painful illness.

Moore & Ledding is the name of a new firm of jewelers who have just commenced business in Washington, D. C.

V. Schopperle, of Old City, Pa., was recently married, and with his bride, visited New York on their wedding trip.

L. C. Bernay's jewelry store at Little Rock, Ark., was recently broken into and robbed of \$1,000 worth of goods.

Twenty-seven different designs for flop-over buttons have been patented in Washington, and the cry is still they come.

W. H. M. Christie, F. R. S., succeeds Sir George Airy in the office of Astronomer Royal at the Woolwich Royal Observatory.

Rhine-stone goods are growing in public favor. Many beautiful and attractive designs are offered in buckles, back combs, pins, etc.

D. Sutton's Jewelry store at Kokoma, Colorado, was destroyed in the recent fire at that place. His stock and fixtures, valued at \$3,000, are a total loss.

B. R. Farr's jewelry store, at Eldred, Pa., was entirely destroyed in the recent destructive conflagration that nearly destroyed the town. His loss is estimated at \$10,000; insurance unknown.

Sir George Airy, late Astronomer Royal for England, is to be awarded the highest possible pension, in consideration of his long and valuable services to science while director of the Royal Observatory.

The Alexandrite gem is one of the most beautiful stones worn. The color is a rich green, turning to a brilliant red by gaslight, and strongly resembles the chrysoberyl (catseye stone.) Green garnets are also much sought after.

An attempt was recently made to burglarize the jewelry store of W. L. Jones, at Martinsburg, W. Va. Fortunately the safes resisted the efforts of the thieves to blow them open, and becoming disgusted, made good their escape.

The fossil trilobites, traced by geologists to the extreme past, holds a conspicuous place in many new designs of jewelry. These stones are of a dark gray tint, through which you spy a small shellfish, curled over apparently sleeping; the effect is very novel and pleasing.

William Schroeder, a youth of 18, has been arrested on a charge of obtaining two gold watches valued at \$85, from Messrs. Max Freund & Co., on the representation that they were for his father. Schroeder at once admitted his guilt, and was held for trial.

The trade is warned against a number of well-known thieves, who have been frequently seen in Maiden Lane and John street during the past few days. They are evidently contemplating mischief. We suggest that Capt. Burns be requested to detail a special policeman to watch these erratic individuals.

L. Rosenfeld, traveler for S. A. Rider & Co., wholesale jewelers, St. Louis, while traveling on a freight train on the Wabash road, was robbed of his sample trunk about ten miles from Centralia, Mo.; the trunk was found broken open and rifled of goods of the value of between \$1,000 and \$2,000. There is no clew to the perpetrators.

It has been noted of late that one of the members of the firm of Carter, Sloan & Co., has been very absent-minded, and was apparently walking in realm of bliss and ecstasy, of which he alone enjoyed a monopoly. At the same time he has grown suspicious of his friends, as if he anticipated receiving a package of dynamite or nitro-glycerine from them. He is reported to be sitting up nights studying the annals of England, and is prepared to prove that Cromwell is the greatest name in history. There is evidently a lady in the case. We sympathize with this gentleman, and long for the day when he will return to this sublimity sphere. We are not at liberty to mention his name, but can say it is not Mr. Carter, nor does he constitute the Co. Probably he will be dis-Gus-ted with this paragraph, but we must chronicle current news.

During the past few weeks there has been a marked reduction in the price of sterling silver goods. It was thought that prices had reached bed rock, but now comes a further reduction of ten per cent. This is the result of the strong competition that has prevailed in the trade. While the prices now governing the market are maintained no child has any excuse for being born without a silver spoon in it mouth.

The pearl fisheries on the Pacific Coast are reported to be very active this season. A correspondent of the *New Orleans Times* says: Every family has strings of fine pearls for beads. The pearl oyster abounds along the shores of the Gulf of California, and thousands of the men go annually as to a picnic to dive for pearls. They bore a hole through each one of them. Many of them would bring \$1,000 to \$1,500 or even more in proper markets, were it not for the holes.

In THE CIRCULAR of last month we gave an account of the capture in Philadelphia of a well-known thief named Sheridan. He was accused of stealing diamonds from J. K. Davison, of that city, and was believed to have been implicated in the robbery of Enos Richardson & Co.'s trunk in Washington, some months since. Through the persistent efforts of Mr. Davison, Sheridan has been sentenced to three years in the state prison. This makes one rogue less for the Protective Union to keep watch of.

The "Hellenic" is one of the most elegant and attractive bracelets that has been introduced this season. It consists of an elastic spring coil of gold, so constructed as to conform to the wrist or arm of the wearer. The ornamentation of these bracelets is in the highest style of the goldsmiths' art, and takes on various exquisite forms, being adorned with highly ornamental centers, and some of them richly studded with jewels. This "Hellenic" is destined to become an exceedingly popular article of personal adornment.

The exhibitors who have secured space at the Atlanta Exhibition are quite dilatory in getting their goods into position, and the opening of the Exhibition was delayed in consequence. This lack of readiness is especially noticeable among the jewelers, who have signified their intention of sending goods. Mr. J. P. Stevens, of Atlanta, exhibits a full line of goods, however, which we shall especially describe in our next issue. In fact, we shall make a point of noticing all in the jewelry line on exhibition at this Atlanta fair.

The search for pearls in the mussels of Ohio has been a considerable industry for years. The *Nashville American* reports an outbreak of pearl hunting in Stones River, Rutherford County, Tennessee. Not less than 500 people were engaged daily in raking the bottom of that stream, delving down in the mud for mussels, which are pile along the banks, opened, and critically examined for the treasure contained in many of them. One pearl is reported for which \$2 was paid in New York. The general range of value, however, is said to be from 50 cents to \$25.

The gross weight of diamonds contained in packages passed through the Kimberly Trust Office in 1880 was 1,440 lbs. 12 oz. avoirdupois, the estimated value being \$3,367,800. These figures compare with 1,174 lbs. and \$2,846,631 in 1879; 1,150 lbs. and \$2,672,744 in 1878; 993 lbs. and \$2,112,427 in 1877; and 773 lbs. and \$1,807,532 in 1876. The annual value of the mines in the Kimberly division owned at the end of 1880 by the Government and the London and South African Exploration Company, is estimated as follows: Kimberly, \$1,000,000; Old de Beer's, \$2,000,000; Du Toit's Pan, \$2,000,000; Bulfontein, \$1,500,000. At the end of last year 22,000 black and 1,700 white men were employed at these mines. From the Kimberly and Old de Beer's mines alone diamonds to the extent of 3,200,000 karats are annually raised, while the other two mines above named yielded 300,000 karats last year. At the diggings on the Vaal River about 250 men were at work last year.

The peculiar failure of Joseph Steinau & Co., of Cincinnati, that occurred recently, has provoked much unfavorable comment in the trade, in view of the alleged surroundings of the case. The liabilities of the firm are stated at \$54,000, and the assets at \$17,000, of which \$7,000 are reported to be pledged to secure what is claimed to have been a cash loan. At the first meeting of creditors the firm offered 35 per cent. in settlement of claims, but this offer was rejected; subsequently an offer was made of 50 per cent., 20 per cent. cash, 20 per cent. in 6 months, secured, and 10 per cent. in 12 months, unsecured. At the present writing this offer has not been accepted, and efforts are being made to induce the creditors to acquiesce in it. Owing to the great variety of statements made relative to the financial condition of the firm shortly before the failure, suspicion was excited that matters were not as they should be, and much criticism has been indulged in at the expense of the firm. Mr. Steinau failed to appear at the first meeting of creditors, but was represented by counsel. Had he put in an appearance his arrest would probably have followed.

It seems that we cannot have such a luxury as the electric light without paying for it more dearly than the mere price, as represented in money, amounts to. A break in the insulator permits woodwork to be fired by contact with the naked wire, and invites similar accidents from time to time. The greater the number of electric lights the greater the risk. The fire Commissioners draw attention to this subject, and claim that the brave men who expose their lives in extinguishing fires find a new danger in severing the electric wires, which often have to be cut away from the tops of houses. No fatal accident has yet been caused, but the liability is all the time increasing.

A young man has been going about in the trade representing himself as a son of C. S. Ball, of Syracuse. His plan has been to call on dealers and select certain goods to be sent to his alleged father. Among the articles selected would generally be a chain, for which he would represent he had a customer in this city. He would have the chain charged on the bill of goods sent to his reputed father, but take it away with him. Of course, the order was soon found to be unauthorized by Mr. Ball, but meantime the young fellow got away with the chain. Several firms have been victimized in this way, and the trade is warned against the seductive ways of this persuasive young man.

The railroad war that has prevailed for some time past, resulting in the cutting of rates of travel to an exceedingly low point, has had the effect of inducing many persons to visit New York, who are not in the habit of doing so. Great numbers of small buyers improved the opportunity, and the trade has felt the beneficial influences of their visits. Although individuals of this class do not leave large orders, the aggregate of their trade amounts to a large sum. Manufacturers and jobbers have been delighted to make the personal acquaintance of these dealers, many of whom have long bought goods of them, and the pleasant relations existing between them have been strengthened by the social intercourse they have thus been enabled to enjoy.

Great complaint is made in the trade, and throughout the mercantile community generally, at the advance of prices recently made for the use of telephone by the telephone companies. These instruments have been found quite useful, and hundreds of them are employed in business houses. When first introduced the charge was six dollars a month, but the price has been advanced, till last month it was put up to twelve dollars a month. As this price is thought to be extortionate, many business men have ordered the instruments removed from their offices. This is a practical illustration of the greed of gain causing the slaughter of the innocent. It is true that the telephone is convenient sometimes, but they are by no means indispensable.

Geo. Stimpson, of Old Mackinac, Mich., is the owner of a relic that is a curious combination of wrought silver, it consisting of five pieces—two seals, one watch key, one ring, and a clasp all at one time must have inclosed a watch-guard. One of the seals is in comparatively good shape, and showed the original design very plainly, and in quite plain figures the date 1563 appeared to the naked eye, or 318 years ago. On the ring, which connects the different pieces together, is the device of a dagger and the letter "M," thus indicating that it might at one time, possibly, have been possessed by Father Marquette, who founded the first mission at Old Mackinac over 200 years ago. It was found by a gentleman looking for relics inside the old fort grounds there, and from him it was purchased by Mr. Stimpson. Jewelers think that it is of French make. If it was not owned by Father Marquette, doubtless it must have belonged to some of the early French settlers. Still, it might have been buried by some of the inhabitants of the fort before the massacre of 1763. Quite a number of interesting relics of bygone ages have been found there recently, including a silver bracelet, now in the possession of J. D. McDonald, a large silver cross, and Mrs. G. W. Stimpson, and about nine yards of beads by one of Mr. Stimpson's younger sons, and several finger rings and other curious trinkets.

A Chinese vase, it is contended, is an article of furniture, whereas a Greek vase is a specimen of art. The latter belongs naturally to a museum, where it may inspire the student of painting and sculpture; the former is found, without surprise, in the boudoir of a lady or the dining room of an opulent banker. And yet the Greeks decorated their houses with vases long before they relegated them to the uses of their tombs, as the Romans also did. They painted them instead of pictures on their walls; they contrived a harmony between their shapes and those of the buildings they were intended to ornament; they gave them plinth and base, frieze and cornice, and each was a charm and a study in itself. But could there be conceived a collection more monotonous and exhausting to the mind's interest than one composed exclusively of Chinese jars? as anyone will testify who has visited the vaults in the Japanese Palace of Dresden, where the whole is only redeemed from immediate dullness by a scholarly

system of classification, chronological and illustrative of the different types. On the other hand, a Chinese vase standing alone is an object of exceedingly little attraction in itself. It is a picture which wants to be set in a frame, to be associated with a variety of trophies, to be reflected by mirrors, to be draped about by handsome curtains, and so forth. If all this be true—and the argument is a French one—your Chinese vase can scarcely be said to be worth anything in itself. It is only partially true, however. No doubt the Chinese value their ware instinctively on account of certain qualities which, by western connoisseurship, are only prized at second hand—the "crackling," for instance; but it is the same with their gigantic flowers, dragons, and chimæras—objects such as to which the Greeks never gave either expression or form.

The present general fall trade has been the largest ever experienced by New York merchants. The troubles of 1878 were succeeded by an advance all along the line in the succeeding year, and then by a genuine business boom in 1880. The spring "boom" following was unprecedented, but it sinks into insignificance when compared with the enormous trade of this fall. At no other time since the century began has New York City been visited by so many strangers. For weeks the hotels have been filled with guests, and that in a literal, not a hotel sense. People have been fanned out to private houses by even some of the larger hotels, and there is not a city in the Union that has not been represented on the hotel registers. The expenditure of money by this great influx of strangers has given an impetus to all trades and to all the mercantile enterprises, from that of the peanut vender to that of the enormous houses of the dry goods and grocery trades. The business prosperity of the metropolis is only a reflection of the prosperity of the country at large. There are, of course, local troubles here and there that affect the local trade; but all sources of information point to the fact that there was never before such general mercantile prosperity. Particularly is this true of the west. The number of buyers from that part of the country has been very much larger than ever before, and the merchants are unanimous in the avowal that goods have been bought with less caution and greater liberality than ever before. Owing, no doubt, to the drought and the unsatisfactory cotton crop of the south, the buyers from the south have generally been cautious in their purchases; but the aggregate of their buying yields a large sum nevertheless. The comparative failure of the grain crop in the west, and the western states might possibly have had a depressing influence but for the greatly increased facilities for transportation, the cheap freight rates and a marked increase in the price paid the producer.

The manufacturers of silver plated ware in this country have begun a movement to secure the admission of silver plated ware into Paris, from which country they have been excluded by law up to the present time. The commercial treaties between the United States and France make no provision for the export of plated ware into the latter country, and the result is that, while this ware is admitted from England and other countries, the American product is expressly prohibited by law from entering France upon any terms. The leader of the movement to secure a new treaty is Charles Casper, President of the Meriden Silver Plate Co., of Meriden, Conn. In speaking of the subject Mr. Casper said: "When I was in Paris, three years ago, I was surprised to find that our American silver plate goods could not be admitted, even to be placed on exhibition at the World's Fair. I thought it somewhat absurd that our productions should be excluded from any civilized country, but I had no remedy. There was no treaty which included in its provisions the admission of these goods to France, and there was a special law prohibiting their import. The manufacture of silver plated ware has become one of the leading industries of the United States. In Meriden alone, the great manufacturing center of these goods being produced there annually, I employ over 500 men in one factory alone, and the production of these goods in the United States amounts to at least \$20,000,000 annually. I see no reason why we should not be allowed to make a market in France if we can do so, and I believe that we can if this unjust discrimination against us is removed. There is no reason why it should not be removed, and I believe that if Congress will only take the matter in hand we can easily make a treaty with France admitting our goods to her ports. Let her put whatever protective tariff she pleases upon them. All that we ask is to have the absolute prohibition removed, so that we can have a fair chance to compete with England and other countries in the French market. The prohibition now is so strictly enforced that when Tiffany & Co. sent over a solid silver set, with one plated tray, the silver tray was rejected. I am drawing up a petition to Congress on the subject, which will be signed by all the leading manufacturers of the country and presented by Senator Platt, of Connecticut, and I believe that we shall succeed in securing a treaty which will be satisfactory."

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THE

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A School of Art Industry.

FOR several years THE CIRCULAR has persistently advocated the establishment of a school of art for the special benefit of young men engaged in, or desirous of learning, the goldsmith's art in all its branches. In this country, as a rule, dealing in jewelry and gold and silver ware and watch repairing go hand in hand, so that the term jeweler is commonly accepted to designate one who deals in jewelry, watches, clocks, and all that pertains to the precious stones and metals. Consequently, in speaking of "the trade," we include all its numerous branches, and in advocating a School of Art Industry, we mean one that shall impart technical knowledge in all the branches we have enumerated. At the annual dinner, a year ago, of the Jewelers' Association, Mr. Thomas G. Brown, its Treasurer, and a veteran in the business, knowing all its requirements, alluded to this important subject, adding the weight of his words to the arguments advanced in these columns in favor of such a school. By a singular coincidence, at the dinner of the Association last month, the Hon. Carl Schurz concluded a brilliant address with these words:

"If an Association like this should undertake to found institutions or the artistic training of workmen in your trade, it would be of immense advantage to you. A school of art industry, where your young men are thoroughly instructed in drawing, in designing, in the theory and practice of decoration, so as to gradually have their eyes opened to the true essence of beauty—to put before them the great artistic models that can be brought or copied from the master workmanship of other countries, is something, in my humble opinion, worthy of consideration. It would seem to me, gentlemen, although your manufacturers produce silverware which deceives everybody but the artistic burglar; although your watch and clock makers are producing goods that not only keep time, but may with good taste be placed on our mantelpieces, as articles of ornament; although your goldsmiths are already defying the world at large in their skilful work-

manship—there is higher development still attainable, and you might, in establishing such institutions, not only do a very useful thing directly for your own interests, but also something worthy of imitation by a great city like this."

Mr. Brown spoke from an actual practical knowledge of the business, while Mr. Schurz spoke as a statesman, having unusual facilities for knowing the methods pursued in foreign countries to promote and advance their art industries, to educate skilled workmen, and to employ their labor to the best advantage. The student of the political economy of nations arrives at the same conclusion that the practical manufacturer does, and concludes that what is necessary to advance the art work of this country are schools of design and instruction.

Mr. Schurz cites the fact that goods of American manufacture now compete in the markets of the world with those of foreign manufacture. This is very true, and is a fact of which we are justly proud. But what enables them to do this? Is it because they are superior from an artistic standpoint, or simply because of the fact that we possess better machinery for doing the work, and are so enabled to produce goods at a lower price? America owes much to the old world for what we know about art; the jewelry trade is indebted to it for designs as well as for the skill that reproduces those designs in the precious metals. In return, what has the trade given the old world? Cheaper goods, cheaper metal, and improved machinery; but we have not given them a higher art standard, nor art work superior to that already familiar to them. American industry, intelligence and improved machinery have not added one iota to the elevation of the art standard, as exemplified in the precious metals, or the science of horology. It is true that our workmen produce some elegant examples of the goldsmith's art, original in design and novel in form, but the methods of their production are but adaptations of the methods that have been known for many years, and that have enabled the workmen of Europe to produce as good, if not better work, in other forms and in other designs. Our manufacturers of watches make true and trustworthy timekeepers, and at a low price, but their standard of excellence is not superior to that of watches made many years ago. The genius of America should not be content with being simply an imitator—superiority should be our motto, and we should not hesitate until our art standard is exalted above that of any other nation. We have the genius, the poetic fancy, the skill, the mechanical ingenuity to do this if they are properly directed. The great painters of the world, whose works have made them famous, spent years in acquiring that technical knowledge of the art, without which their genius would have been lost; instruction in the rudiments of their art, laborious drudgery, and weary study were necessary to give wings to their genius, and enable them to produce those perfected art gems, that have made their names famous for all time. Artistic inspirations are Divine gifts, but artists are made, not born; their inspirations must be educated to run in proper channels, or their possessors become simply erratic individuals, whose genius is wasted for lack of training. These facts are so thoroughly recognized in the old world, that schools are founded to suit every phase of genius; and thorough, practical training is the rule in art as in mechanics. It is for this reason that Europe leads us in all matters pertaining to the fine arts. While this country was in the pioneer

stage, this was to be expected; but in these days, when wealth is abundant, refinement and culture being its natural accompaniments, there is no longer an excuse for our backwardness. It is an admitted fact that Americans are now the most liberal patrons that European art workers have to depend upon. Why, with all our intellectual capacity, should we go abroad to gratify our tastes for the beautiful? Certainly the jewelry trade will have no occasion to do so, when it utilizes to the best advantage the talent it can so readily command. With a school of art industry established, where the young men of the country can be thoroughly trained in the several branches of art that pertain to the jewelry trade—designing, drawing, horology, gold and silver ornamentation, etc.,—in a few years we should have a class of artists and skilled workmen, whose products would challenge the world to equal in points of originality of conception, design, and workmanship.

If two or three energetic men, well known in the trade as having its welfare at heart, would take the lead in a movement to establish a school of art industry, we are confident that in thirty days an endowment fund sufficient to guarantee success, could be obtained with little difficulty. What is necessary is for some one to formulate a plan for establishing and conducting such a school, and subscriptions for its maintenance will be forthcoming at once. As for instructors, where can better men be found than Whitehouse, of Tiffany & Co.; Pairpoint, whose classical designs are so well known; Wilkinson, of the Gorham Company; or Osborne, of Tiffany & Co.? As a teacher of the science of horology, none better can be found than "Excelsior," so well known by his invaluable contributions to *THE CIRCULAR*. In the jewelry specialty, there are a dozen men whom we could name, who are thoroughly competent to impart instruction in their art. As for patrons of such a school, and who would derive great benefit from it in their business, there are Tiffany & Co., Robbins & Appleton, Durand & Co., the Gorham Company, the Whiting Company, Wood & Hughes, Dominick & Haff, Carter, Sloan & Co., Baldwin, Sexton & Peterson, Hale & Mulford, J. F. Chatellier, and scores of others, whose ambition it is not only to sell goods, but to produce those of a character to command attention by reason of their artistic excellence. A school of art industry identified with the jewelry trade, if established on a basis to command confidence, would soon become self-sustaining, for there are hundreds of young men who would be glad to pay tuition, while there are many watchmakers in the country who would rejoice at an opportunity to perfect themselves in the higher branches of the art, and would gladly pay for a diploma issued by an institution recognized by the trade. The products of the pupils would soon become a source of income also; indeed, such an institution would soon develop a variety of ways for adding to its income and making itself self-sustaining. All that is required, is a modest endowment to begin with, and the energy of one or two good men to push the scheme in the trade. The necessity for it is recognized; the lack of it is a serious obstacle to the advancement of our art standard. Until our young men, ambitious to excel in their calling, can have the advantages that are afforded abroad, there is little hope of their achieving that degree of excellence in art or workmanship that is to be found where schools for art education abound. The remarks of Mr. Schurz fell upon the ears of some of the most intelligent and enterprising men in the trade, who combine large public spirit with an honest ambition to promote the interests of the industry to which they are wedded, and we sincerely trust they will not pass unheeded. *THE CIRCULAR* is desirous to further the plan by every means at its command, and, should some of the enterprising men in the trade inaugurate a movement to accomplish the end desired, we will give them our earnest and hearty support. We regard a School of Art Industry as the one great thing to be desired within the trade.

Commercial Travelers.

THERE is no more hard-working or useful class of the community than our commercial travelers, nor is there any class of men that contributes more to the success of the manufacturing and commercial interests of the country. Nearly every industry now has its traveling representatives, who go from city to city, and village to village, bringing to the attention of the business men of those places

everything that is new and valuable. In this age of progress, when art, science and inventive skill are busy with the problems of mechanics and art, persons distant from the great commercial centers would remain in ignorance of the wonderful advance that is being made in the industrial products of the day were it not for the commercial travelers, who visit them and exhibit and explain every new device and every new invention. The jewelry trade is liberally represented by commercial travelers, and their influence upon the trade is felt alike in the stores of retail dealers, the counting rooms of the jobbers and the workshops of the manufacturers. They are the medium through which the requirements of the retail dealers are made known to the manufacturers, and the products of the manufacturers brought to the attention of the retailers. Commercial travelers are, as a rule, gentlemen possessing good business capacity, sharp, quick-witted, indomitable in performing their duty in the face of every obstacle. They are selected because of their special qualifications as travelers and salesmen, and to entitle them to the positions they hold, they must enjoy in a high degree the confidence of their employers. This being the case, when calling upon the members of the trade, they should be treated with the same degree of courtesy that would be shown to a member of the firm they represent. When a leading house in Maiden Lane, for instance, selects one of its trusted employees to visit the trade in the west, any discourtesy shown such employee is a slight put upon the house that employs him, and is pretty sure to be resented in some way by such house. Retail dealers sometimes are inclined to treat these representatives of prominent houses in a cavalier manner, and to subject them to a loss of time and to other annoyances. When the traveler for Brown, Jones & Robinson, of New York, presents his card to Mr. Smith, of Oshkosh, or Peoria, that gentleman may be talking politics in the back room, and says let the traveler wait. He forgets that the traveler has his route laid out and engagements made ahead, so that he can spare but a short time in each place, and every moment he is detained is a loss to him; that he calls to do a favor to the retailer, by bringing to his door the markets of the whole world, thus enabling him to select his stock without so much as leaving his store. He forgets, also, that the traveler represents in his own person, the firm of Brown, Jones & Robinson, and is entitled to every consideration that would be shown to any member of that firm. The traveler sinks his own identity entirely, asking no consideration for himself, but only respectful treatment of his firm. They incur the expense of sending him forth to present to the trade the latest novelties they have produced, and the retail dealers, who are thus enabled to buy in Oshkosh or Peoria, the goods they desire, at New York prices, should appreciate the efforts made for their accommodation, and cheerfully accord to the traveler such time as may be necessary to examine his samples. He is not importunate; he is not a bore; if his goods are not desired, a simple negative will satisfy him, but unless his stock is examined he has just reason for thinking that a slight has been put upon the firm he represents. Discourtesy shown to commercial travelers is sure to react upon the heads of those who give expression to it. There are certain retailers who have a most unenviable reputation among commercial travelers, and who would be surprised to know the low estimate put upon them by manufacturers and jobbers, simply because of their boorish treatment of their traveling representatives.

Commercial travelers have a hard life of it at best, and their lines are not cast in the pleasantest of places. Obligated to be absent from their homes and families a good portion of the year, to spend their times in railroad cars and hotels, subject to all the accidents, annoyances, and inconveniences that attend incessant traveling; to get up at unseasonable hours to catch trains; to arrive in the middle of the night, perhaps, at some little town, and be forced to carry their luggage through the dark streets in search of a hotel; to encounter storms of snow, wind and rain at all times; to suffer with perpetual colds caught during such exposures; to maintain unceasing vigilance over that precious sample trunk, laden with thousands of dollars worth of goods; to be obliged to face the terrors of dyspepsia that lurk in the meals furnished at

wayside railroad stations, are among the ills to which they are subjected. All these, and many other discomforts, fall to the daily lot of the commercial traveler. If there be added to these, rudeness or discourtesy on the part of those with whom he is forced to come into business contact, his position is rendered most irksome and undesirable. It is pleasant to know that, as a rule, commercial travelers are well treated by the trade, and the value of their services fully recognized, but there is an occasional snob or upstart in the business, who thinks it adds to his importance to behave rudely to these representatives of manufacturers and jobbers. A greater mistake they cannot well make. Politeness and courtesy in business, as in social life, mark the conduct of the true gentleman, and are among the best investments that any business man can make. When the leading men in the trade think so highly of commercial travelers as to employ them at great cost, it ill becomes the retail dealers to depreciate their importance. We are led to make these remarks because we have recently heard of one or two instances where retail dealers had behaved with rudeness towards some of the best known travelers in the trade. If these individuals learn that their credit is impaired in New York, they may know that it is because well-bred business men look with suspicion upon one who is lacking in business courtesy. As we have before remarked, the travelers in the trade are able, competent gentlemen, as a rule, and are as much entitled to respect and confidence as they would be if their names, in letters a foot long, were conspicuously displayed over a store, or an office in Maiden Lane.

The Jewelers' League Reserve Fund.

IN the November issue of THE CIRCULAR we published a circular letter issued by Mr. Woglom, President of the League, asking members to co-operate with him to secure for the benefit of the League, the balance of an unexpended fund contributed by the jewelers to the Chicago Relief Fund at the time of the disastrous fire in that city. It appears that some \$5,000 thus contributed by the jewelers was not used, but was returned a few years since to the committee that had charge of the collection of the money at that time. This committee is now anxious to be relieved of the money in some lawful manner, and as, at a meeting of the contributors, it was voted that they would not receive back their *pro rata* shares, the only way in which it can be legally transferred is to have those who contributed execute a release to the committee. It seems eminently right and proper that this money should be turned over to the League, to go into the reserve fund. This is the only organization within the trade devoted exclusively to benevolent purposes; it numbers some 1,500 members, very many of whom were contributors to the Chicago Relief Fund; the money was designed for charitable objects, and certainly none is better entitled to the confidence of the trade than that which cares for the widows and orphans of the men who, in their lives, were identified with it. The committee having the money in charge are desirous of surrendering it to the League, provided they can be relieved of further responsibility regarding it. To this end it is necessary to obtain from the original contributors releases, duly signed, and forwarded to the president. As many of the contributors were employes of different firms and corporations, some of whom have since changed their location, it is desirable that every member of the League exert himself to find such persons and obtain their signatures to the printed release that will be forwarded by Mr. Woglom on application. Most of these employes are still working in the business somewhere, and if every member of the League would inquire in the workshops to which he has access for contributors to the Chicago Relief Fund, their releases could be obtained. A little combined action, promptly rendered, will undoubtedly result in securing this fund for the League, where it will be devoted to the great object for which it was subscribed, viz., charity. The Constitution of the League provides for receiving donations to the reserve fund, the interest on which only can be used in discharging the obli-

gations of the League, the principal being permanently invested, thus serving as a substantial guarantee of the indemnity promised in case of death. This is an important and urgent request made by the President, and we trust every member of the League will make an earnest effort to give it force and effect.

The Jewelers' League is a benevolent organization in the truest sense of the word, as it furnishes the means of keeping from want the widows and orphans of members who may die. So long as a man is in health, he expects to be able to make provision for the family he has gathered around him, but there are thousands in the trade whose sudden death would result in plunging into poverty and distress the loved ones to whom his life was devoted. While no one can stay the afflictions caused by death, it is in the power of humanity to alleviate the pangs of poverty occasioned by such a sad calamity, and this is the purpose of the League. On the death of a member, the League pays to his surviving representative the sum realized from an assessment of \$2 on all other members, thus removing all apprehension of immediate want. The officers of the League are gentlemen of high standing both socially and commercially, and have, at a great sacrifice of time and personal interests, devoted themselves to the promotion of the welfare of the League. How successful they have been is shown by the large membership, and the admirable business-like manner in which its affairs have been conducted. It has already taken a foremost rank for character and standing among the various benefit societies of the country, and, as its membership increases, will become the leading and most influential one. Its doors are open to every member of the trade whose physical condition brings him within its rules, and all should avail themselves of the benefits it offers. We hope to see the membership doubled during the coming year.

The Atlanta Exposition.

[FROM OUR SPECIAL CORRESPONDENT.]

ATLANTA, GA., NOV. 20, 1881.

The recent Industrial Exposition held at Atlanta, Ga., performed a grand work, in exhibiting to the people of the south, the agricultural and manufacturing possibilities of that region, and by bringing face to face, upon a platform of mutual benefit, the producers of the south and the projectors of manufacturing industries of the New England states. The moving cause of this exhibition was ex-king cotton. It has been demonstrated that the value of the cotton crop is depreciated fully twenty-five per cent. in the picking, ginning, baling, pressing and shipping—that is, between the ripe staple in the field and the market where it is sold. The object of the Atlanta exposition was originally to bring to the attention of cotton producers, the improved machinery for handling the staple in its various phases, and thus saving this enormous waste. But as the scheme progressed, it took on added interest, and finally became an exposition of the industries and commercial resources of the south. The extent of these was a surprise to the southerners, and the result is that the leading men of the south are now, in conjunction with northern capitalists, devising means for developing those resources to their fullest extent. One practical result will probably be the erection, by northern capitalists, on southern soil, numerous cotton mills, so that the great staple of the south will henceforth go forth to the world in a manufactured state instead of being subjected to the loss incident to shipping the raw material.

Among the exhibitors at the exposition were several representative houses in the trade, thus contributing their share to the representation of southern commerce. The American Watch Co. displayed an elaborate line of gold and silver watches, movements and cases. All grades of their watches are comprised in their exhibit, which attracts marked attention. A novel feature is one of their movements enclosed in one of their patent screw bezel, dead proof cases, suspended in a vase of water. It runs perfectly and keeps correct time in this position. Their goods are very much admired, both for their beauty and great variety. They have examples of all their well known movements, cased in almost every form, some of the cases being rich and unique in ornamentation.

J. P. Stevens & Co., of Atlanta, the leading jewelers of the state, and one of the most important houses in the south, make the most attractive display in the Art Department, exhibiting samples of jewelry, watches, silverware, bronzes etc. They have produced a most beautiful effect by using the handsomest drapery, immense mirrors, and casings of French plate glass, silver mounted. Their space is octagonal in shape, and situated so that the crowds can pass entirely around. Included in their exhibit are samples of watches made in Atlanta. This firm has a watch factory of their own, where fourteen persons are employed. They buy watch material in the rough and finish it in their own factory. The Jaccard Jewelry Co., of St. Louis, have a favorable situation, handsome cases, and a large stock of diamonds, precious stones, general jewelry and silverware. Their display attracts a great deal of attention. Near by can be found the exhibits of the Aurora Silver Plate Co.; Hamill & Co., Silver Plated Ware Manufacturers, of Baltimore; and the Meriden Britannia Co. The Waterbury Watch Co. have a showy exhibit also. Messrs. Hagstoz & Thorpe, manufacturers of the well-known Boss' Patent Filled Case, have an exhibit that will be sure to bring many new customers to this enterprising house. They show some case decorations which they displayed at the Paris Exposition, and which is no doubt equal to anything that has ever been produced in this line.

It will be seen that the jewelry trade is well represented, and I have been assured that several other firms intended to come, but were unable to secure space.

In the Mineral Department there are numerous specimens of precious metals and stones found in the south. Of gold there are about 2,500 specimens. One nugget of native gold weighs \$500. They have a \$3,000 gold button, an illustration of retort product, or how the metal is precipitated in the retort after the quicksilver is evaporated from the amalgam. In the same case with the native gold specimens and button, are eight gold bricks from Georgia mines, and quartz with free gold in wire, leaf and granulated forms. In two other cases are all the precious stones except the turquoise gem. One Georgia diamond, weighing $2\frac{1}{2}$ karats, is fine in color and cut. There are sapphires, Oriental and other rubies, topaz, chalcodons, garnets, agates, green quartz, onyx; also in the list are a number of specimens of the Hiddenite, the newly discovered precious gem, which is in demand among the lapidaries and manufacturing jewelers. Of sapphires there are numerous specimens and almost every variety. There are also specimens of garnet, topaz, opal, and every variety of the quartz family. There are also some beautiful specimens of native marble, which have attracted much attention. From North Carolina come some specimens of flexible sandstone, which Baron Von Humboldt christened "the mother of diamonds." It is found in many places in that state, and may ultimately lead to the discovery of diamonds.

The wealth of the south is here illustrated in a manner never before attempted, and which is a surprise as fully to the people of the south as to their visitors from the outside. The jewelers' exhibit is but a fraction of the industries represented, but in point of attractiveness it holds its own with the others.

J. H. C.

Tommy Hill.

THE *Wolverine Citizen*, of Flint, Mich., tells the following sad tale relative to the fate of one of the most general travelers in the trade: "Only a few of our readers, except as they may have met him in connection with his duties as a commercial traveler, will recall the genial little gentleman familiarly known among his friends—and they were limited only by the number of his acquaintances—by the name which heads this item—'Tommy Hill'—for a few later years representing in the west, the large silverware business of the Whiting Manufacturing Co., New York. Among his acquaintances Mr. Hill's talent was well known not to be confined to an excellent and pleasing capacity for presenting the beauties of his wares, but that his leisure hours were beguiled, not infrequently, and the musical taste

of his friends, gratified by exquisite and really artistic flute playing. His personal visits to Saginaw have repeatedly been the occasions for concerts, in which he appeared as a favorite participant in their programmes, and was excelled by few professional artists.

"But there is a minor refrain to this otherwise cheerful life. This amiable and social gentleman could turn to but two living beings in whose veins flowed the same family blood; one a dependent younger sister in New York, and a cousin, residing in Detroit. Neuralgia, for many months a distressing companion, finally resulted in derangement, and final softening of the brain; and to-day, our genial and musical friend is a hopeless inmate of the Asylum at Pontiac. The case is given an especial shade of sadness to us, in the circumstance that in these hours of loneliness and misfortune, he may not seek solace in the sweet and sympathetic tones of his loved companion while in health—his flute. But we are told that before he had fully lost the consciousness of his approaching fate, he sought "surcease of sorrow" in playing, and burst into tears at the discovery—which must have been appalling in its meaning—that his brain had ceased to communicate to his lips the art which he had enjoyed so much, and delighted others with hearing. It seems the more sad that he cannot realize the sympathy which hundreds feel—for 'Tommy Hill.'"

"The Pearl of India."

MESSRS. RANDEL, BAREMORE & BILLINGS, of this city, have recently come into possession of one of the most celebrated and elegant diamonds ever known to the world. It is an old mine gem, of extraordinary interest, weighing $25\frac{1}{2}$ karats. It is cut in the old style, and experts in both the old world and the new declare that in this respect it cannot be improved. The material of which it is composed is unequalled in those peculiar characteristics so essential to the diamond. Its surpassing beauty, brilliancy, and exquisite proportions have attracted the admiration of experts and connoisseurs, who speak of it as a marvel of splendor. The diamond is absolutely perfect, and will bear the closest inspection under the most powerful glass, which is a remarkable fact considering the size of the stone. At the beginning of the present century, this gem belonged to a Rajah in India. Accounts of its great beauty coming to the ears of the Viceroy of Egypt, he sent a special commission to the Rajah to negotiate its purchase, in which the commission was successful. Shortly after it had come into the possession of the Viceroy, his favorite daughter was married to the Sultan, "The Pearl of India" constituting one of her wedding presents. Since then it has remained in possession of the Imperial family of Turkey, until purchased, at the beginning of the present year, by Randel, Baremore & Billings. This gem, the equal of which is not known in the world, can now be seen at the office of the firm above named.

Obituary.

It is with profound sorrow that we announce the death of Mrs. L. M. Leberthon, which occurred at Brooklyn on the 16th ult., at the residence of her father, Mr. Henry Ginnel, after a long and painful illness, in the 24th year of her age. Mrs. Leberthon was the youngest daughter of Mr. Ginnel, and was a woman lovely in her character, and beloved by a large circle of friends. About four years since she was married to Mr. Leberthon, a well-known importer of this city. Shortly after this event, an incurable disease developed itself in the person of the young woman, which not even the best surgical skill in the country could cure. After lingering for months in great agony, death finally released her from her earthly sufferings. When it was known that the end was near at hand, she sought an interview with her devoted father, when they bid each other a lasting farewell. The scene was one of most heartrending character, for the love existing between father and daughter had ever been of the most intense character. A great sorrow has fallen upon the hearts of the husband and parents of this lovely lady, and in their great grief it cannot but be a consolation to them to know that they have the sympathy of every member of the jewelry trade, as well as of their hosts of friends outside of it.

A. A. MCGOWAN.

A. R. McGowan, a young man in the employ of Wheeler, Parsons & Hayes, died suddenly during the past month, as is reported, from an overdose of chloral, which he had taken to alleviate the pains of neuralgia. He had just become a member of the Jewelers' League, having been accepted September 3d. He was an estimable young man, and was held in high regard by the firm employing him. He leaves a widow and one child, who will be placed beyond immediate want by the benefit conferred upon them by the League.

Views of Correspondents.

This department of *The Circular* is open for communications relative to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's name shall be disclosed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

MORE ABOUT THOSE PERQUISITES.

To the Editor of the *Jewelers' Circular*:

I see my little communication in *The Circular* for September has provoked considerable commotion, and furnished you a text upon which to hang two or three of your "highly moral" editorials, pitting into me vigorously, and denouncing my sentiments. That is your business, I suppose. You have got to preach morality, whether you practice it or not, same as the preachers do. I can stand it, so go ahead, but I can tell you there are lots of dealers in the trade who take their "perquisites" with as little compunction of conscience as I do, and who are glad to make their profit out of it. In fact, we all do it, and we all know when we do it. Because I take advantage of the customs of trade, it is no reason why I should be classed with thieves and pickpockets: they are not either of them, but a quiet and peaceable citizen, supporting my family by my daily labor, and paying my taxes as readily as any other citizen. But manufacturers of jewelry furnish me goods that they represent to be of a certain quality; I pay their price for them, and I sell them according to their representations, making such profit on them as my customers will permit. This, I conceive, is legitimate trade, and is what the dry-goods merchant, the druggist, and other tradesmen do, but nobody calls them thieves and swindlers. If manufacturers debase the quality of their goods, that is their lookout, and I am not responsible for it; but if by so doing they can sell me their goods for a less price than formerly, that is my good fortune, enabling me to make a better profit. That is what I am looking for, and I am going to buy my goods of that man who can sell me the most attractive looking stock for the least money. My expert is my customers don't care so much for quality as they do to look and have just the same 10-k. as 14-k., if they don't know the difference. Now, if I can sell them the cheaper grade why should I not pocket the difference? The customer is satisfied, the manufacturer gets his pay, and I have no reason to complain. What difference does it make to a man whether the spring in his watch case is light or heavy, so long as he is satisfied with it? Yes, the fact that it is a heavy spring gives me and the maker a chance to make a good profit on it. I fail to see how this transaction makes me a robber or a dangerous man in the community. Certainly I am not so regarded, for my townsmen have twice elected me to the City Council, I have been town treasurer, and am a deacon in the church. When I was treasurer an investigation of the affairs of the office was made, because I sold town bonds at a profit and kept the money I made in the transaction, but there was no law to prevent my doing this, and the investigation left me all right. I have made money in business, but I could not have done so if I had followed your advice. Manufacturers cannot deceive me much in the quality of their goods, and I believe they all know me to be a close buyer, and when they send me 10-k. goods as 14-k., I can tell every time whether the 10 karats are there or not. If they are not up to representations, I make a discount when I come to pay for them. This is where an expert has an advantage over the public, and he is entitled to a profit on his superior knowledge.

The Circular may keep up its high toned moral clamor, but it will not change the practices of the trade one particle. Manufacturers will continue to make their profit by cheapening quality, and retailers will keep right on selling these same goods. As long as the public does not know the difference there is no harm done, but the saving of gold effected in reducing the quality enables us to make a fair and legitimate profit. As the practice is universal, I propose to keep it up, and my conscience upholds me in so doing.

H. J. P.

[There is no use attempting to argue with a deacon of the church, who believes in misrepresentation and fraud, and makes a living by practicing his belief. But suppose his grocer charges him \$10 a barrel for the best quality of flour, and then sends him the second or third quality, worth but six or eight dollars a barrel? Will he kick up a row about it, or will he, like a good, complacent deacon, submit to the swindle without protest? Where is the difference between selling inferior flour for best quality, and 10-k. gold for 14-k.? The only difference we can see is that the purchaser of the gold goods does not know he is swindled, and the other does. "H. J. P." is evidently one of those who believes that a crime consists in being found out, and governs his conduct by the restraints imposed by law.

But wherein is the crime less to him who perpetrates it? There are bank robbers, burglars, and thieves enough at liberty, who have never been detected, to fill all our state prisons, but because they were not detected in their crimes, are their crimes of any less magnitude? The moral ethics of "H. J. P." must be of a curious sort, that permit him to exercise spiritual authority over his townspeople on Sunday, and rob them in a business transaction on Monday. But words are wasted on this fellow. By his own admissions he is a thief, and is striving by specious and false reasoning, to justify his offences to his own conscience. Unfortunately there are many of his class in the world, and altogether too many of them in the jewelry trade. *The Circular* will continue to do its part toward driving them out, and, evidently, its words are having some effect when they bring to the surface such rascals as "H. J. P."—Editor *The Circular*.]

ROLLED-PLATE GOODS.

To the Editor of the *Jewelers' Circular*:

I have noticed in *The Circular* of late several communications relative to rolled plate goods. The writers complain that there has been a deterioration in quality of late years, and wonder why this is so, assuming by inference at least, that the manufacturers are making large profits by debasing their wares. This is far from the fact. While I am willing to admit that a large proportion of the rolled-plate goods made to-day are inferior in quality to what they formerly were, nevertheless, I assert it to be a fact that the manufacturers' margin of profits is materially less than it was. Then why, may be asked, do they debase their goods? Simply to keep pace with the demands of the retail dealers. Let a traveler go on the road to-day with samples of the best quality of goods, and nine out of ten of the retail dealers he visits, will tell him that his goods are too high-priced; that it takes too much labor to sell them; that they want something that is equally attractive, but cheaper. In obedience to this demand, the manufacturers have lessened the thickness of the plate used, and also reduced the quality of the gold employed. Instead of 14-k. gold, they use 12, 10 or 8-k. gold, and sometimes debase the metal to a still lower point. But their prices go down proportionately, and so do their profits. It stands to reason that we had rather make an article worth five dollars, on which we make 10 per cent. profit, than make a precisely similar article for \$2.50, on which we make the same percentage of profit. Retail dealers pay for what they get, and for that alone, and the immense profits said to be made by manufacturers from debasing the quality of their goods, is purely imaginary. If your correspondents want the first quality goods they can get them by paying the price, but if they expect to get a gold dollar for fifty cents, they will find themselves greatly disappointed. Manufacturers have the good sense to supply the market with goods that are in demand, and retail dealers make that demand. If they want first class goods, let them stop buying the "cheap and nasty." They will find it to their advantage in the end if they will seek to educate public taste to a better appreciation of fine goods, than to fritter away their time dicker with paltry cheap goods, the sale of which does not redound to their credit.

Newark, Oct. 20, 1881.

DEGRADING THE QUALITY OF GOODS.

To the Editor of the *Jewelers' Circular*:

I have been a jobber in jewelry for many years, and have witnessed, year by year, the gradual debasement of the standard of goods. It has gone on from point to point, till now there seems to be no limit to the base metal used by some manufacturers in the production of so-called gold goods. In many of them the base metal so preponderates that if a seller were arrested for misrepresentation, any criminal court in the land would convict him of fraud. If these goods were sold to the public in every instance for just what they are, of course, there would be no fraud in the transaction, but many 10-k. goods are sold and warranted as being 14-k. fine. I am of the opinion that retail dealers are largely responsible for this degradation of the standard. They have been so anxious to cut prices that the quality has become a secondary consideration. Manufacturers have done a very unwise thing in catering to this demand for low-priced goods; they could have preserved the standard had they so desired, but the multiplicity of manufacturers led to excessive competition, and quality had to suffer in consequence.

But there is one phase of this question I have not seen discussed in your columns, in which I find so many good things. When a manufacturer consents to mark 10-k. goods as being 14-k. fine, he announces to the trade his willingness to deceive, or to aid in a swindle; this being proof positive that he is lacking in conscience,

what guaranty has the jobber that he, too, is not being deceived, and that instead of the 10-k. goods, (marked 14-k.) for which he pays, he is only getting 7-k. or 8-k. goods? He has nothing to rely upon but the word of the manufacturer, who has deliberately stamped a lie upon the face of his goods? The old maxim, *falsus in uno, falsus in omnibus*, applies here with admirable force. If a man deliberately plans to deceive the public, why should he not be suspected in all his transactions? Jobbers and retailers are quite as much at his mercy as the public, and he can as readily sell them 8-k. goods for 10-k. as he can induce them to sell his 10-k. goods, that are represented to be 14-k. In the parlance of the day, these manufacturers "give themselves away badly," and by their proclaimed acts, lead us all to look upon them with suspicion. The steel springs in watch cases, the push pins, etc., that have been sold so much gold, have always been dangerous temptation to fraud, and was led to its legitimate consequences, viz., the increasing of the weight of such base metal, out of all proportion to the amount of gold in the case. When one manufacturer found that by increasing the weight of base metal in a watch case, and selling the whole for gold, he could thereby increase his profit, at the expense of his integrity, he set an example that was bound to be followed and carried to its utmost limit, by other manufacturers as unscrupulous as he. There is rivalry even among thieves, but when a man proclaims himself to be a thief, he must expect all men to so regard him. How else can we regard a man who comes to us with a case marked 14-k. and informs us that it is not only not 14-k. fine, but is loaded with spring, etc., and asks us to sell it to the public as a 14-k. case, and share the profits with him? What sort of guaranty can such a man give that he is dealing honestly with even those who, he claims, he is taking into his confidence? I have had to handle these debased goods, as every other jobber has, and I regret, as every honest man in the trade must do, that the standard of quality has been so degraded. It is time the honest men in every branch of the trade, from manufacturer to retailer, took a firm stand against these unscrupulous men, and demand from them honest goods or—none. For the future, I propose to exact a certificate of quality in every bill of goods I order, and to hold the seller responsible for any misrepresentation I discover. If all buyers will do the same, we can soon restore the reputation of the trade, and make it too hot for unscrupulous men to remain in. Meantime I hope THE JEWELERS' CIRCULAR will keep up its fight for honest goods and commercial honesty.

JOBBER.

AN EXPLANATION.

To the Editor of the *Jewelers' Circular*:

It having recently come to my knowledge that the impression prevails among the trade that I was "cut off" by the Elgin Watch Co., for violation of my contract, I avail myself of the columns of your valuable journal to publicly state that such was not the cause. I will briefly state the circumstances. The Elgin Watch Co. threatened to drop me from their list of jobbers unless I gave them orders for goods which they admitted they did not have, and did not know when they would have. Not being in the habit of discounting the future in my own business, and considering myself entirely competent to run my own business, I declined to accede to their terms, hence their action. I do not wish to be understood as questioning the right of the Elgin Co. to refuse to sell me goods upon their own terms, but I do question their right to publish the fact of their declining to recognize me as a jobber without giving the reason therefor, thus leaving the trade to infer that it was for a violation of contract. I do not believe that the sentiment of the trade would uphold them in attacking the business integrity of any jobbers, even by inference.

Yours respectfully, CLEMENS HELLEBUSH.

Practical Treatise on the Adjustment of a Cylinder Watch.

[Translated for THE JEWELERS' CIRCULAR from the 24-price essay of Vincent Lauer.]

Continued from Page 269.

I mentioned, at the time when treating of the removal of the movement from the case, that the workman should examine whether it sits firmly and is well retained therein. If everything is found in good order, the question may be regarded as disposed of; but if any defects are discovered, I would recommend to at once proceed to their correction, before attempting anything with the movement.

The fastening is generally arranged as follows: The plate is confined by the rim thus, that it may in nowise wobble to and fro, and is firmly retained either by three pins and one screw, or by one pin and two screws.

By the first arrangement, the middle pin fits into a notch in the

rim, whereby the turning of the movement is prevented. The other two pins stand a trifle higher, and catch into the inner part of the rim, and in this manner prevent a dropping out of the movement, together with the case screw, which sets opposite the middle pin, and whose form is sufficiently known to watchmakers. If it contains only one pin, it also occupies the place where the plate is retained in the rim, but is stronger than in the first case, and longer; it is flattened for half its length from the dial-plate side, its full part enters into a notch, while the flat part seizes in the inside of the rim. Two case screws are placed at different points of the plate, not opposite to each other, but forming a triangle with the pin. Serious defects in this respect are less often to be met with in watches of a better kind, but the more current qualities require the finishing touches of the improving hand.

It often occurs that the rim is too large, and the plate is thus not kept sufficiently firm and stable, whereby the movement, when being wound or jolted, moves from side to side. This fault may be remedied by putting pins into three or four places of the plate, where it is bounded by the case, which are filed down sufficiently until the plate lies firm, without shake, in the case.

The uses and functions of the pins which retain the plate within the case, are explained already; if they should not answer, nothing remains but to replace them by new ones.

The screwheads are too small at times, and do not catch the case rim; in such a case, other ones, with larger heads must be inserted. Again, they often stand too high, and thus leave free room between their lower end and the rim. The screws are either countersunk, if they penetrate with sufficient thread into the brass, or, if it is to be feared that the number of turns of the thread is so small as to take but a slender hold, little studs are best soldered into the inside of the rim, which are lowered until the screws rest well upon them. If the screwheads are countersunk, a sinker with three or four cutting faces works to best advantage; one with only two faces does not work well, as the sinking is opened about one-third.

When the fastening of the movement is arranged to satisfaction, we proceed to

CHAPTER V.

THE FASTENING OF THE DIAL.

Watches handed to the adjuster leave much room for further desires in this particular. The dial pillars and screws are on hand, of course, but they oftentimes stand in such large holes that a firm retention of the dial is out of the question, and the screw heads are either too small, or stand too far apart. I would recommend in the first instance to remove the pillars altogether, and to fasten the plate by two small screws, say at the figures 3 and 9, in the minute circle, to at the same time answer for minute points.*

The second fault is corrected by inserting new dial-plate screws with larger heads. A tapering, well-ground drill is best for boring the holes for the small screws, which is moistened during the operation with spirits of turpentine or water. Patience is a necessary requisite when doing this work; hastening simply works mischief, as the dial may crack or spring out.

Next examine if the figure 12 is exactly in its place, and if the dial stands concentric to the plate, thus that the hands move truly from the center; if this is not the case, the hands will gain upon one side and lose upon the other. However, I do not say by this that it is the only reason for such a defect; the division of the dial as well as the train may equally be at fault.

*NOTE BY THE PRIZE JURY.—Why should the holes, if too large, in the plate, not be bashed? The removal of the pillars and replacement by screws would disfigure the dial; there are other means, beside this. Horrmann, in his prize essay, recommends a method which might be used to advantage in such a case, when the holes are too large and it is not desirable to bash them. He says: "If the feet of the dial are too thin, and nothing is left to firmly fasten them, file them still thinner, and solder, with tin, drilled shells of suitable thickness over them; then make the appropriate openings for the screws, and round off their ends. This method does not disfigure, and offers a secure fastening. Also, pillars are to be found, the notches of which, for the screw heads, are too broad and too high above the plate. Fill such notches lightly with tin, and make by turning the dial screw into it, a suitable opening. It also occurs often that nothing can be done with the screws; the best remedy, then, is to use thin, well-filled pins."

When the dial is fastened, examine if the canons of the hands have sufficient shake within the holes, and that no frictions occur. Put the plate with dial into the case, and see if the crystal rim closes well, without pressing too much upon the dial; if it does, remove sufficiently from the circumference of the latter, which operation is best performed by the emery wheel, fastened into the turning tool. When grinding, moisten the wheel well with water, to create no heat, which would cause the enamel to fly out. This operation may also be performed by the file, which must be right sharp, however, and moistened with turpentine or water. The file should always be brought from the inner to the outer side, and lifted when returning; this holds equally good when enlarging the holes of the hands.

CHAPTER VI.

THE CENTER WHEEL WITH MINUTE WORK.

The center wheel, with few exceptions, always occupies the center of the movement, and must not be moved from its place; by faulty depthings the barrel and the third wheel must accommodate themselves to it. An inspection and correction of the train also commences at this wheel. The defects occurring at this part are of various kinds. The adjuster must examine if the pinion is of right size, that a good depthing may be obtained, that the wheels do not stand too high or too low, the pivots protrude sufficiently beyond their holes, etc.

It is often found that the center wheel has been filed thinner, by which treatment a shoulder has been formed on the wheel, on the place where it comes into engagement with the shoulder of the pinion, on which the barrel teeth rub, or by their commencing to engage with the pinion remain hanging. This defect may, in many cases, be corrected by a slight breaking away of the upper edge of the barrel teeth, (by putting the barrel upon a left arbor), and by raising the center wheel, as well as by lowering the barrel, if both parts, barrel and center wheel, approach each other too close. When the above has been well considered, we go to the following:

The bridge must receive some attention, by investigating if the foot pins and screws serve their purpose. The first often enter with difficulty into the plate, and an accidental bending is inevitable; often the bridge does not sit upon the plate at all, because the foot pins cannot be forced in; again, it occurs that they have too much shake, not sufficiently retaining the bridge. In the first instance, if the pins are too strong, the defect is easily altered, by carefully assisting with the reamer, the second case is somewhat more difficult. If only a trifling shake is present, the pins may be parted a little, but if it be of any magnitude, it is best to bush the holes; to insert new foot pins is connected with difficulties, because the appearance of the movement is somewhat marred thereby, if it cannot be regit. If the adjuster would prefer to put in new foot pins, let him do as follows: After the defective one has been removed, put the bridge on, and drill a hole into it, of the exact size as that of the plate, to a depth of about three fourths the strength of the bridge. Next cut in a screw thread, and insert a foot pin in the English fashion. It may be found a trifle too strong, therefore rub up the hole with a reamer as much as necessary. For drilling, use a so-called canon drill, to be described at the end of this treatise; it works with more security.

A further disadvantage in regard to the placement of the center wheel bridge, arises if the screws are not round; the bridge is thus moved to and fro when the screws are tightened, and it is to be feared that the wheel assumes a different position every time when the screws are drawn on; when this is the case, replace the defective ones at once.

When the bridge has been set in order, and the pinion is found to answer, put it in, and see if it stands straight, by inserting an arbor into the hole or the center staff, and letting the plate revolve a few times; if it moves quietly without wobbling—that is, from side to side, the wheel stands true; if not, the defect must be corrected. Take the wheel out again and try if the pinion runs true and round, by revolving it upon an arbor. If the pivots run untrue, return them carefully and polish them again; this should also be done when their polish is defective.

The polishing of the center pivots is quickest done within the depthing tool; for further information see article, "The turning in of a new center pinion." If the pivots are well polished, examine whether the holes need bushing. Many watchmakers have the habit of bushing all the holes when readjusting a watch; but I do not see the reason for doing it, if the holes are satisfactory. If, therefore, I find in a watch that the brass is of sufficient thickness, is not cracked, and the pivot holes fit well, I leave them as they are; but I do not by any means say that the aforesaid method is reprehensible, to bush every hole; everything depends upon the time and pains to be bestowed upon the work in hand.

If the pivot holes are too wide, but stand truly over each other, rub them up still more, break the sharp corners with a three-faced counter-sinker, and finish with a round file, to roughen the broken edges, that the bushing may remain better in place. Little notches are often filed in, in watches, but the bushing will not fully enter them, wherefore I prefer the former method.

If it is found on a preliminary trial that the center wheel stands out of perpendicular, a deviation in the method of bushing as recommended must be made.

The hole in the plate must be bushed in the customary manner; a bushing is also fitted into the bridge, which either has not been drilled through at all, or in which the hole is at least much smaller than is requisite for the pivot.

Next fasten the plate into the head of the universal lathe, and center the hole; then put the bridge upon it and drill the hole through, finishing with a little graver, until the point almost enters. If an already pierced bushing was inserted, the hole must be opened sufficiently, until the graver has touched every part.

To facilitate bushing for future repairs, I insert none yet in the bridge, but by turning open the hole sufficiently, after having fastened the plate in the head of the universal turning tool, and to such a depth as I intend to have the thickness of the bushing, and bush it round in the customary manner. The purpose will easily be seen—the old bushing need simply be taken out by future repairs, and a new concentric one is inserted. It need only be turned upon its sides, which, after having proceeded as proscribed, is barely necessary.

If the pinion arbor is short, the bushing should protrude within, but if too high, turn out the plate somewhat, if the wheel is to come below; but the bridge should be turned out if the wheel stands sufficiently deep already. If the sinks are sufficiently deep, or the holes are rather short, it is better to turn the pivot shoulders back and repolish them.

When the center wheel has been thus well put in, insert the center staff, and try if it does not press the pinion pivots oval, whereby a pinching is produced. This is often the case if the center staff is put in a defective manner. Should this happen, weaken the staff at the place of the pivot by filing; should this cause it to go too easy, make a few holes in several places, which come to the middle of the pinion, with a hard pointed steel punch; burrs will thus arise, and the staff will subsequently go too strong, which may be remedied with the pivot polishing file.

Another method to cause a center staff to work strong is the following: Lay the staff upon a brass plate or upon a filing-wheel, and press the cut of a sharp file into it by imparting to it a rolling motion; a certain burr is thus produced, easily corrected with the polishing file. All other methods, such as the insertion of bristles, putting in leaf gold, or the flattening of the staff should never be made use of; it is done often, however.

The dust plate, also called the hand plate, must fit well upon the center staff, to prevent its sliding beyond the point of the center pinion, or remaining upon the center rim of the pivot, as a burr is easily produced thus. A further defect shows itself, if the shoulders of the square of the center staff is oblique, as in this case the little plate also will assume an oblique position, and will rub the bridge with one side. To correct this fault, file the shoulders of the square sufficiently; but the neat workman will prefer to turn it. For this pur-

pose use a fuzee arbor, but he who has none at his disposal, may perform it upon a chuck turning tool. A hole is drilled into the chuck of the verge, of sufficient size to permit the square to move to and fro within it. When about deep enough, grind the point of the drill like a screw-driver—flat—to also make the hole bottom flat. The hole must be a little less than the hand-square is long. The obtained opening in the verge chuck is filled with shellac, and the square is inserted; toward the end of the staff is put the point of the slide, and while the lac is yet warm, the verge is set in motion, and a cleaning wood is held near the shoulder against the arbor, whereby this is guided exactly to the middle. When the back is cold, you may turn the staff as much as is necessary to correct the shoulder.

At first glance, this method appears to be rather round-about, but actually it is not so. If once the chuck has been prepared, the subsequent work will be short; this thus prepared chuck may also be for other work, the only thing necessary is that the article to be lapped upon it should be larger than the drilled hole. Now put the center staff into the center pinion, and try if it is straight, by setting the wheel in motion and observing the end of the staff, whether it runs true. Should the staff be bent, notice to which side it inclines, and straighten it by hammer taps, by using an underlay of brass, lead, or hard wood.

CHAPTER VII.

THE BARREL WITH CLICK AND STOP WORK.

The moving power of the watch proceeds from the barrel, by the operation of a tightly coiled elastic spring contained within. The impediments arising from its use are communicated to the entire train, and prevent a correct rate of the watch, if it does not refuse to go altogether. The different defects of this part were already foreshadowed in Chapter II, when treating of the taking down.

We will suppose that the center wheel is put in perfect order; put in the barrel without spring, and see what defects are apparent—if it stands obliquely, too high or too deep, whether it rubs on the center wheel, or below with the plate, the dial or the minute work. Also examine how it stands with regard to the depth of the center pinion, if too deep or too shallow, sometimes both is the case if the barrel is not round, whereby it seizes too much with one side, too little with the other. After having ascertained the existing errors well, take it down again to correct the ascertained defects.

As already said by the center wheel, also here inspect first the bridge, because it often happens that at some time or other it was sadly maltreated. The under side of the bridge has sometimes been burred, to place the barrel higher; remove this. If the barrel hangs too much toward below, and if you desire to place it higher, drill three or four holes into both feet; only two-thirds, however, of the height of the bridge; insert brass pins into these holes, letting them protrude so much as is desired to raise the bridge. This rule holds good for always; it is the only permissible method to be used to raise the bridge. The burring on the sides of the bridge, the punching in of holes, round, square, or three-cornered, with punch or graver, should never be done; nor the laying between of paper, leaf gold, etc. The bridge is only to be raised when it has been the victim of botchwork, or when it is actually too high. In any other case assist the pivots by turning to raise the barrel.

Next set in order the entering or taking out of the foot pins of the bridge in the plate, correct or replace, if necessary, the screws in the same manner as indicated by the center bridge. If the bridge is in order, examine the three or four screws of the cap; if they should not draw or contain other defects, replace them by new ones.

The barrel arbor is next to be examined; its pivots, if required, should receive a few helping touches, and the burr removed on the sides of the ratchet teeth. This latter defect, especially, is often overlooked, but by later repairs it will show itself by the wearing of the cap or bridge.

If it was noticed that the barrel stands inclined find out whether the defect arises from the bridge or the barrel arbor; it can be easily

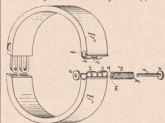
ascertained by turning the latter with a key and observing whether the lower end works true or in a little circle. If the barrel arbor is untrue, it must be returned. Should you ascertain that this arbor is round, the sink in the bridge is at fault, set it upon the plate and put it into the turning lathe, and deepen the bottom of the sink sufficiently, until the lowest place in it has been reached. Put the ratchet into it, and if it lies deeper than the plane of the bridge, upon which the cap is to be placed, turn off sufficiently from this place until both surfaces, that of the ratchet, as well as of the bridge, lie at one height. If the barrel rubs within the sink, take off the bridge, and assist the offending place by turning.

The ratchet next engages our attention; the necessary labor, in case it is too weak, has already been described; should it be stronger than the depth of the turning, and the bridge does not permit a deepening, either by reason of being too weak, or of the danger that the barrel might be placed too low, the cap must be turned off from its lower side. For this purpose, lac the cap with its lower side upon a plate, turned flat upon both sides, provided with a hole in the center.

(To be continued.)

Patents.

SPRING-HINGE FOR BRACELETS.—Thomas D. Cleveland, Newark, N. J., assignor to Isaac A. Alling, Horace Alling, and Wm. R. Alling, of same place. Filed June 17, 1881.



Claim.—The combination of the eyes *a* and *b* of a spring-hinge, the eye *b* having an internal lug, *i*, and the eye *a* a recess, *m*, with a rivet or pin *f*, and with a spiral spring, the wire of which terminates abruptly at one end, *x*, for abutting against the said lug *i*, and the other end projecting at *y*, for fitting into the said recess *m*, all set forth.

CUFF BUTTON.—Shubael Cottle, New York, N. Y. Filed July 14, 1881.



Claim.—A button for cuffs, etc., consisting of an ornamental top portion, a hollow shank provided with a vertical notch, and a back or shoe having a central hole and radial slot, as shown and described.

SAFETY-PENDANT FOR WATCHES.—Charles S. Hirst, Philadelphia, Pa. Filed Mar. 19, 1881. Patented in England Dec. 14, 1880.



Claim.—The pendant *B*, with sockets on opposite sides, in combination with the spring bow *C*, formed with bulbous ends and provided with securing encircling collars, which are fastened to the pendant on the outside thereof, substantially as set forth.

FASTENING FOR EAR JEWELS.—Geo. W. Washburn, West New Brighton, N. Y. Filed Aug. 4, 1881.



Claim.—1. A fastening for ear-jewels, comprising parts *a* and *b*, united by a hinge-joint, *c*, which has a movable middle part carried by the part *a*, said middle part of the joint being provided with a catch-notch, and said part *b* constructed in the form of a curved tube and provided within with a locking-bolt engaging with said catch-notch, and with a spring for projecting said bolt, substantially as herein specified, for the purposes set forth.

2. The combination, in a fastening for ear-jewels, of the ear-wire *xy*, the slotted curved tube *b*, the hinge-joint *c*, having a notched middle part carried by said part *a*, the bolt *e*, adapted to interlock with said middle part of the joint, the projecting spring *d*, arranged within the upper part of said tube, the retracting projections *i* and *k*, and the trumpet-mouth *z*, receiving the point of the ear wire and forming an abutment for the spring, as specified.

3. In a fastening for ear jewels adapted for pierced lobes, the combination of main parts *a b*, provided at their upper ends, respectively, with a lobe point, *y*, and a trumpet-mouth, *z*, to receive said lobe point, and a hinge joint, *c*, with horizontal pintle uniting said parts *a b*, said parts *a b* being curved to snugly embrace the lower edge of an ear lobe, and said parts *y z* curved in the line of motion, substantially as shown, for the purposes set forth.

WATCH REGULATOR.—John A. Awalt, Anderson, Ind. Filed July 12, 1881.



Claim.—1. As a new article of manufacture and adapted to be applied to any watch now in use, the perforated and bifurcated frame *C*, combined with the perforated and threaded rod *D* and threaded nut *E*, as and for the purposes set forth.

2. The combination of the perforated and bifurcated frame *C*, the perforated and threaded rod *D*, and the threaded nut *E* with the bridge *A* and the regulator-arm *B*, as set forth, for the purposes specified.

SAFETY PINION FOR WATCHES.—John A. Awalt, Anderson, Ind. Filed July 12, 1881.



Claim.—The center wheel, *C*, having annular recess, *D*, and shoulder *d'*, and the pinion *B*, having projection, combined with the locking wheel *E*, having elongated central aperture, *e*, tooth *e'*, and inclined lug *e''*, and with the mainspring barrel *A*, as and for the purposes specified.

WATCH GUARD.—Tobias Kohn, Hartford, Conn. Filed June 2, 1881.

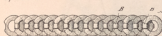


Claim.—1. The conical metallic shell or socket *B*, and the tapering wedge *C* fitting therein, in combination with a cord or ribbon, *A*, as a device for securing the ends of said cord within the socket, substantially as described.

2. The spring-clasp *E*, hinged to one side of the socket *B*, and hooking into the opposite side, in combination with said socket, substantially as described.

3. The points *B'*, cut from the sides of the socket *B* and bent outward, in combination with said socket, substantially as described.

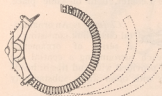
ORNAMENTAL CHAIN.—John Becker, Providence, R. I. Filed Apr. 8, 1881.



Claim.—1. A link for ornamental chains formed from a single piece of metal, having heads 1 1, perforations 2 2, and connecting portions 3, in combination with fastening-strips for securing such links to one another in a series.

2. The combination of the perforated links of angular form, adapted to overlap and form a series, and having the recesses 3, with the fastening-piece *B*, having hooked ends 5 5.

BRACELET.—Willis H. Howes, New York, N. Y., assignor to Hale & Mulford, same place. Filed July 26, 1881.



Claim.—1. A bracelet composed of a flexible part of helical twist or its equivalent, constituting the main portion of the bracelet, and a rigid part having its under side curved and combined with the flexible portion and forming an integral part of the body of the bracelet, substantially as described.

2. A bracelet of elliptical form composed of a rigid part opposite the minor axis of the ellipse, with its under side curved, and a flexible part of helical twist, or its equivalent, completing the ellipse, substantially as described.

3. The combination, in a bracelet or other annular article of jewelry, of an enlarged head extending over one-fourth of the circumference, more or less, and an elastic or flexible part connected with opposite ends of said enlarged head, substantially as described.

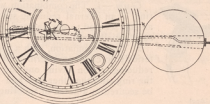
BRACELET.—John Etzensperger, North Attleboro, Mass. Filed June 13, 1881.



Claim.—1. As a new article of manufacture, a bracelet, the two wings of which are hinged together by a ball-and-socket universal joint, as described.

2. The combination, with the wings *a* and *d*, of the ball *e* and socket *b*, and the latch *c*, constructed to form a bracelet, as described.

PENDULUM INDICATOR FOR CLOCKS.—Henry J. Davies, Brooklyn, N. Y. Filed Apr. 14, 1881.



Claim.—1. In a clock, the combination, with a part moving or vibrating in unison with the pendulum, and a dial having in it a slot or elongated opening, of a pin or arm attached to said vibrating part and projecting through the slot or opening in the dial, and an indicator attached to said pin or arm in front of the dial, substantially as and for the purpose specified.

2. In a clock, the combination, with a part moving or vibrating in unison with the pendulum, and a dial having in it a slot or opening, of a pin or arm attached to said vibrating part and projecting through the slot or opening in the dial, and an indicator detachably secured to said pin or arm in front of the dial, whereby provision is afforded for readily substituting one indicator for another of different form, substantially as and for the purpose specified.

GEM SETTING.—Charles F. Pardee, North Attleboro, Mass., assignor to George W. Cheever, same place. Filed May 27, 1881.



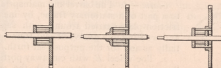
Claim.—1. A two-part gem-setting composed of an open-end interiorly-grooved frame having slots, as described, and an open-end frame provided with studs formed to engage said slots, the said frames, when combined, being adapted to hold in position a stone or stones placed therein, substantially as set forth.

2. The combination, with a stone or stones, of an open-end interiorly-grooved frame having slots, as described, and an open-end frame provided with studs which engage said slots, the combined frames encompassing the stone or stones and holding the same in position, substantially as set forth.

3. The combination, with a stone or stones, *C*, of an open-end frame, *A*, having slots *a' a'* and bifurcated ends, as described, and an open-end frame, *B*, having studs *b b*, substantially as described and shown.

4. The combination, with a stone or stones, *C*, of an open-end frame, *A*, having slots *a' a'*, and an open end frame, *B*, having studs *b b* and a ring or equivalent, *D*, substantially as described and shown.

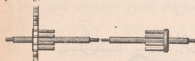
PINION FOR CLOCKS AND WATCHES.—Arthur E. Hotchkiss, Cheshire, Conn. Filed Jan. 21, 1881.



Claim.—1. A pinion having its leaves secured at one end by solder and a washer or disk forced against the opposite ends of the leaves substantially as set forth.

2. A pinion having its leaves secured to a wheel or collet at one end by solder and a washer placed over and arranged to conceal said soldered ends, substantially as set forth.

PINION FOR CLOCKS.—Arthur E. Hotchkiss, Cheshire, Conn. Filed Jan. 25, 1881.



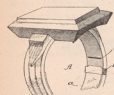
Claim.—1. A clock or watch pinion having its leaves secured at one end by solder or fusible metal, substantially as set forth.

2. A clock or watch pinion having its leaves secured by solder to a toothed wheel, substantially as set forth.

3. A clock or watch pinion having its leaves secured by solder to a toothed wheel, and the latter soldered to a pinion-shaft, substantially as set forth.

4. A clock, watch, or other pinion having its leaves and shaft secured in place by solder, substantially as set forth.

FINGER RING.—Jacob G. Missmer, Philadelphia, Pa., assignor of one-half to Edward C. Nield, Trenton, N. J. Filed Aug. 1, 1881.



Claim.—1. The combination, with a finger ring, of an internal reducing-section having an end secured to the ring and a free end, substantially as specified.

2. The combination, with a finger ring internally notched, as described, of an internal reducing section having one end secured to the ring, and the other free and adapted to be secured in a notch of the ring, substantially as specified.

3. A finger ring internally notched, as described, combined with an internal reducing section having one end secured to the ring and a free end provided with a strap or piece lapping over the edges of the ring, and having, further, a projection adapted to fit a notch of the ring, substantially as specified.

WINDING INDICATOR FOR WATCHES AND CLOCKS.—William Haines and Lewis Breitering, Philadelphia, Pa. Filed Feb. 19, 1881.



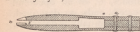
Claim.—1. An index-carrying wheel, in combination with the barrel-arbor or winding mechanism and an armature or plate which is provided with one or more wheels, connecting said index-carrying wheel with the running-down gear, said plate or armature being made rotatable or movable, so as to disengage its wheels from the running-gear, substantially as and for the purpose set forth.

2. The ratchet *J*, loosely fitted on the barrel-arbor and provided with a pin, *J'*, in combination with a cap *K*, which turns with said arbor, and has a segmental slot to receive said pin, substantially as set forth.

3. The wheel *B'*, wheel *F'*, and friction spring *C'*, in combination with the armature *D*, connected to the hub of said wheel *B'* by the clip or friction-joint *E*, the wheels *F'*, and the barrel arbor and running-gear, substantially as and for the purpose set forth.

4. The index *G*, the wheel *F'*, and wheel *B'*, in combination with the armature *D*, connected to said wheel *B'* by the friction-joint *E*, and provided with wheels *F'*, and the barrel arbor and running-gear, substantially as and for the purpose set forth.

WATCH HAIRSPRING CUTTER.—Wm. B. Howell, Albany, Mo. Filed July 1, 1881.



Claim.—The steels *a*, secured parallel to each other by the rivets *a'*, having, respectively, the projection *b* and the corresponding recess upon

their ends substantially as shown.

DEVICE FOR EQUALIZING THE TENSION OF SPRINGS.—David Shive, Philadelphia, Pa., assignor of one-half to Moses Veale, same place. Filed May 4, 1881.



Claim.—1. The barrel and mainspring locked to a part of a stationary frame, by means of a friction-plate carried around with said spring and working in a groove of said frame, substantially as and for the purpose set forth.

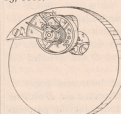
2. The wheel *E*, with cut-away portion *e*, the combined and operating with the groove *a* "steel" *B*, and the frame with the groove *a*, combined and operating with the mainspring and an auxiliary spring, substantially as and for the purpose set forth.

3. The steel *B*, with a projection, *b*, and lug *c* on opposite sides, in combination with the barrel having a notch, *b*, and the frame having an annular groove, *a*, all operating substantially as and for the purpose set forth.

4. The spring connection *F* between the mainspring and the great wheel of the train, substantially as and for the purpose set forth.

5. The annular groove *a*, provided with the segmental friction plate *G*, in combination with the friction plate or steel *B*, substantially as and for the purpose set forth.

WATCH PLATE.—Chas. C. Hinkley, Rockford, Ill. Filed Dec. 23, 1880.



Claim.—1. The combination, with the pallet balance, of eccentric banking screws located on opposite sides of the pallet lever, and adapted to form adjustable stops for the pallet lever, substantially as set forth.

2. A two-part, balance-supporting, cock-bearing, operating to support the balance wheel in position, and made removable, substantially as and for the purpose hereinbefore set forth.

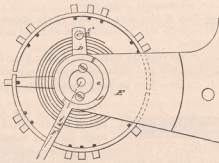
3. The combination, with the balance wheel cock-bearing, constructed with an elongated open slot, of the herein described two-part hair spring stud, located in said open slot, and rendered adjustable therein by the fastening-screw *f* and key *g*, for retaining the hair-spring in place, substantially as set forth.

4. The combination, with a removable two-part cock-bearing, of a balance wheel mounted to oscillate therein on pivotal supports, and made removable independent of the gear train, substantially as hereinbefore set forth.

5. The combination, with a removable two-part cock-bearing and a balance wheel mounted to oscillate therein on pivotal bearings, of a hair spring and the herein described two-part adjustable hair spring stud, substantially as and for the purpose hereinbefore set forth.

6. The combination, with a pallet balance made independently removable, of a balance wheel supported to oscillate on pivotal centers in a two-part cock-bearing made independently removable, substantially as and for the purpose hereinbefore set forth.

WATCH REGULATOR.—Chas. R. Kinehan, Springfield, Ill. Filed Apr. 6, 1881.



Claim.—In a watch regulator, the combination of the plate *a*, having its sides converging downwardly, and attached to or made in one piece with a cock, *E*, of a stud-carrying plate, *D*, and a regulator, *F*, having, respectively, mutilated circle ends *d* and *f*, with their inner surfaces converging upward for engagement with said plate *a*, substantially as and for the purpose described.

ORNAMENTAL CHAIN LINK.—Adolph H. Alsfeld, Providence, R. I., assignor to S. Lederer and B. Lederer, both of same place. Filed May 23, 1881.



Claim.—1. An ornamental chain link consisting of a series of ornamental sleeves arranged edge to edge, and each surrounding a central rod composed of one or more parts, and provided with heads or tips having loops or rings for connection with other links, substantially as described.

2. An ornamental chain link consisting of a series of ornamental sleeves arranged edge to edge, and each surrounding a central rod composed of one or more parts, and provided with heads or tips having loops or rings for connection with other links, the series of sleeves being held together by being clamped between the heads or tips, which are adjustable toward and from each other, substantially as described.

3. An ornamental chain link consisting of a series of ornamental sleeves arranged upon a central rod composed of one or more parts, and provided with tips or heads having loops or rings for connection with other links, the series of sleeves being held together by being clamped between the heads or tips, which are adjustable toward and from each other by means of the screw engagement of the central rod with suitable parts, substantially as described.

BRACELET.—Max Lehfled, Providence, R. I., assignor to Samuel E. Fisher, Edwin D. Sturtevant, and William W. Fisher, all of Attleboro, Mass. Filed July 16, 1881.



Claim.—In a two-part bracelet adapted to turn sidewise to open, and provided with a spring, the interlocking teeth *x x* and band *y*, the parts being combined and operating as set forth.

EARRING FASTENER.—Robert A. Heggie and Edward A. Wagoner, Ithaca, N. Y. Filed Aug. 8, 1881.



Claim.—1. In an earring, the barrel *b*, adapted to turn, and having an eccentric and slotted end next the bent wire-arm *d*, as described and shown.

EARRING SHIELD.—Richard Oliver, Brooklyn, N. Y. Filed Aug. 19, 1881.



Claim.—1. An improved composite jewel-shield, which consists of a metallic backing having a surface made independently and applied thereto, of hard rubber or celluloid, substantially as described.

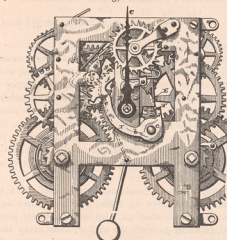
2. A jewel-shield consisting of two independent hemispherical sections adapted to embrace and surround the jewel and to be closed by a spring, substantially as described.

3. A jewel shield composed of two independent hinged sections adapted to be locked both in their open and closed positions by the action of a spring, substantially as described. Also patent filed July 10, 1881.



Claim.—The improved earring shield, which consists of two notched hemispherical portions provided with suitable lap-joints and composed of hard rubber or celluloid, and adapted to include and conceal the jewel of an earring, substantially as described.

STRIKING MECHANISM OF REPEATING CLOCKS.—Charles S. Lewis, Waterbury, Conn. Filed Dec. 13, 1880.



Claim.—1. In a repeating strike-movement, the combination, with a rack, of a snail secured to the hour-hand socket and a twelve-hour wheel loosely mounted on the socket and made friction-tight therewith by means of a plate-washer or other equivalent spring, substantially as set forth.

2. The combination, with a striking clock-movement having a snail located between the two plates and connected with the hour hand, of a rack pivoted to the front plate of the clock movement, said rack having its toothed portion located on one side of its pivotal bearing, arranged to engage with gathering-pins connected with the clock

movement, and that portion of the rack on the opposite side of its pivotal bearing being provided with an arm arranged to engage with the snail, substantially as set forth.

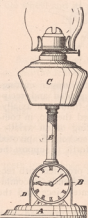
3. In a repeating strike-movement, the combination, with gathering-pins attached to one of the pinions of the strike train, of a rack pivoted to the outside of the frame and formed so that the toothed portion shall oscillate below or within the frame, substantially as set forth.

4. In a repeating strike movement, the combination, with a rack and gathering pins for actuating the same, of a snail attached to the hour-hand socket and a twelve-hour wheel loosely mounted on the socket and made friction-tight therewith by means of a plate-washer or equivalent spring, substantially as set forth.

5. The combination, with an oscillating rack, gathering-pins on one of the pinions of the strike-train, and a count-hook, of a snail attached to the hour-hand socket, a short arm on the rack adapted to engage said snail, and a twelve-hour wheel loosely mounted on the hour-hand socket and made friction-tight by means of a plate-washer or other equivalent device, substantially as set forth.

6. The combination, with a rack, of an hour-hand socket having a snail and hour-hand secured thereto against rotary displacement, and a twelve-hour wheel loosely mounted on the socket and made friction-tight by means of a plate-washer or equivalent device substantially as set forth.

7. The combination, with an hour-hand socket having a recess formed therein, of an hour-hand formed with a projection adapted to enter such recess and secure the same to the socket, substantially as set forth.



COMBINED LAMP AND TIMEPIECE.—John Bell, Higginsville, Mo. Filed Feb. 24, 1881.

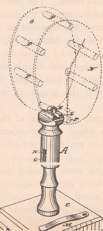
Claim. 1.—In an combined lamp and timepiece, the yoke *D*, constructed and applied substantially as and for the purposes set forth.

2. In combination with timepiece *B*, supported by a pillow on base *A*, the yoke *D*, and lamp *C*, substantially as described.

CHARM FOR WATCH CHAINS.—Edgar A. Cummings, Providence, R. I. Filed Aug. 5, 1881.



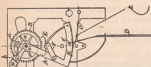
Claim.—In a charm of the kind herein described, the combination of the box *a*, having the hinged cover *b*, the spring-impelled figure *f* in said box, the internal spring-catch, *c*, adapted to engage with a hook or *e*, adapted to engage with a lug in the under side of the cover, and the push-piece *g*, passing through the side of the box, as set forth.



SUPPORT FOR CLOCK WORKS.—Johann J. Vossler, New York, N. Y. Filed July 25, 1881.

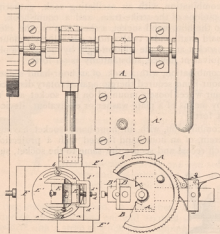
Claim.—The combination of the hollow standard *A B*, having the base *C*, transverse groove *L*, and slot *H*, the rod *D*, having hook at top and thread at the lower end, the cross-wire *G* in slot *H*, and the winged nut *J*, for the purpose of holding clock-work, as described.

DEVICE FOR ADJUSTING THE BEAT OF PENDULUM CLOCKS.—John G. Watts, Osceola, Iowa, and Julius R. Watts, Ashland, Neb. Filed July 19, 1887.



Claim.—The pendant *A*, having the sector-arm *A'*, and hung upon the stud *a*, and having attached to it the pendulum rod *D* and the verge *E*, in combination with the spring pawl *C*, substantially as and for the purposes described.

MACHINE FOR CUTTING DIAMONDS.—Anthony Hessels, New York, N. Y. Filed Sept. 25, 1886.



Claim.—1. In a diamond cutting machine, the upper cutting-diamond holders, consisting of the longitudinally guided and reciprocating carriage, the vertically-adjustable slide-frame, an axially-adjustable frame, and a socket pivoted and secured thereto, in combination with the lower diamond-holders, consisting of an axially-adjustable auxiliary frame, *E*, having a chuck-socket, *E*, pivoted thereto, and a check-piece, *E'*, adjustable, as set forth, to support the socket, substantially as specified.

2. In a machine for cutting diamonds, a chuck provided with rectilinear laterally-adjustable jaws which have beveled ends, in combination with the interchangeable transverse center-piece and the chuck-plate *D*, substantially as described.

3. In a machine for cutting diamonds, a chuck provided with laterally-adjustable retaining-jaws, interchangeable center-piece, and a transverse stop, substantially as described.

4. The upper cutting diamond-holding chuck, composed of the bifurcated and adjustable retaining-tongue, in combination with the transverse interchangeable center-piece and the chuck-plate, substantially as described.

Clocks.

LARGE clocks are impelled by the power of a falling weight at the end of a cord, which is placed around a drum. The power of the weight is greater or less, according as the diameter of the drum is greater or less. The radius of the latter may be regarded as a one-armed lever, but becomes, in connection with the drum wheel, a two-armed one.

Whence the power with which this wheel engages into the pinion, is proportioned to the power of the falling weight, as the length of the drum's radius, multiplied with the weight, to the length of the radius of the drum wheel.

If, for instance, the weight is two kilograms; the radius of the drum, 2 centimeters; the radius of the drum wheel, 6 centimeters; the power with which the latter engages into the pinion is $2 \times 2 \div 6 = \frac{2}{3}$ kilograms.

The power in the clock train decreases with each wheel which seizes into a pinion or a smaller wheel by so much as the radius of the pinion is contained in that of the engaging wheel. If, for instance, the drum wheel, with a power of 750 grams, engages into a pinion of 8 millimeters, and upon the arbor of this sits a wheel of 50

millimeters in diameter, this latter wheel will exert a pressure of only 120 grams upon the next pinion, because $750 \times 8 \div 50$ makes 120 grams, and the calculation of power may be made through the whole train down to the escape wheel.

If it were intended to retain the original power, it would become necessary to let each wheel engage into another one of like dimensions, but the necessary revolutions of the escape wheel would not be obtained while the drum wheel makes one revolution. The power may even be increased by inverse proportions, to let the pinions seize into the wheels.

For example, a weight of one kilogram draws on a drum of 72 millimeters in diameter; instead of the drum wheel, a pinion of 16 millimeters seizes into a wheel of 48 millimeters in diameter, which carries a pinion on its arbor of 8 millimeters in diameter. The power with which this latter pinion seizes into the following wheel is $1 \times 72 \div 16 \times 48 \div 8 = 26$ kilograms.

It will be seen that a great weight might be lifted thus with a small one, but it would also go slower by so much as the weight becomes lighter, because the weight of one kilogram would have to sink through 679 millimeters, until the pinion of 8 millimeters makes one revolution.

CALCULATIONS OF TIME.

Every clock train may, with regard to the purpose of the wheels, be divided into three parts. The first part of the wheels, from the drum wheel to the center wheel, alone determine the time which a clock may go until run down.

The center wheel, upon whose arbor sits the canon pinion and seconds hand, must, since the hand must make one revolution per hour, also do the same. If, therefore, the pinion of the center arbor has 8 leaves, and the drum wheel 144 teeth, these 8 pinion leaves, revolving once per hour, would necessitate the progress of 8 drum wheel teeth, 8 : 144, or the 18th part of its circumference. Since it moves 1 : 18 part per hour, of course it requires 18 hours for one revolution. If the weight cord had only 10 turns around the drum, the clock, until run down, would consume $10 \times 18 = 180$ hours, or $7\frac{1}{2}$ days. It would be an eight-day clock.

How long does a clock with 9 turns around the drum go, the wheel of this having 144 teeth? The first additional wheel has 84 teeth, its pinion 12 leaves; the second one has 80 teeth, its pinion 10 leaves; the center wheel has a pinion of 8 leaves; we thus have

$$\frac{144}{12} \times \frac{84}{10} \times \frac{80}{8} = 9,072 \text{ hours, or } 378 \text{ days,}$$

wherefore such a clock would be a year's clock.

As will be seen by the above demonstrations, the number of teeth are multiplied with each other, also that of the pinions, which sum is divided into the first, and thus we ascertain the number of hours consumed by the clock for one turn of the cord; this number is multiplied by the number of turns, which gives us the whole time of going.

The second part of the train, from the center wheel to the escape wheel, is in the number of its teeth determined by the length of the pendulum, or reverse, the length of the pendulum is determined by the proportion of wheel teeth and pinion leaves of this second part.

For instance, a seconds pendulum is to be used for a clock, the center wheel may receive 64 teeth; the third wheel 60, with an 8-leaf pinion; the scape wheel 30, also with an 8-leaf pinion. The scape wheel, of whose 30 teeth the anchor, after every two pendulum oscillations, or one in every two seconds, drops a tooth, accomplishes its revolution in 60 seconds, or one minute. The third wheel has, meanwhile, engaging into a pinion with 8 leaves, been advanced only 8 teeth, or the $\frac{7}{8}$ part of its circumference. This third wheel, also with a pinion of 8 leaves, has made one revolution in $7\frac{1}{2}$ minutes, and the center wheel has progressed only by 8 teeth, 8 : 64, or one-eighth of its circumference, and will consume $8 \times 7\frac{1}{2} = 60$ minutes before it accomplishes one revolution.

By such existing proportions, when with a seconds pendulum the

scape wheel has thirty teeth, a seconds hand may be put upon its arbor, as the wheel in 60 oscillations will turn round once. The arrangement may also be different regarding the number of teeth, for instance: Center wheel, 60 teeth; third wheel, 50 teeth; pinion, 10 leaves; scape wheel, 60 teeth, pinion 10 leaves. When the center wheel has made one revolution, the third wheel has already made 10 : 60=6; the scape wheel, by one revolution of the latter, 10 : 50 =5; consequently, $5 \times 6 = 30$ revolutions, while the center wheel has made one—or 30 revolutions in one hour. A seconds pendulum would equally be used here, but no seconds hand, because the scape wheel would only turn once round in every two minutes.

EXAMPLES.

To find the length of a pendulum if the center wheel has 72 teeth, the third wheel 60, and a 6-leaf pinion; the scape wheel 30, and a 6-leaf pinion.

Since we know that the lengths of pendulums are reversedly proportioned to each other as the squares of the number of their oscillations, we calculate first, how many oscillations the clock makes in one hour. The center wheel makes one revolution per hour; the third wheel 6 : 72=12; the scape wheel, by one revolution of the latter, 6 : 60=10; by 12 revolutions, $10 \times 12 = 120$ in one hour. Each tooth causes two oscillations, the whole wheel $2 \times 30 = 60$ oscillations; therefore 120 revolutions give $60 \times 120 = 7,200$ oscillations.

In a shorter manner it can be expressed thus:

$$\frac{72}{6} \times \frac{60}{6} \times 60 = 7,200$$

A seconds pendulum, whose length, as is known, is .994.07 millimeters, makes 3,600 oscillations in one hour, and we have the proportions: The square of 3,600 is the square of 7,200= x :.994.07; substituting smaller units, we have $1 \times 1 : 2 \times 2 = x : .994.07$; or $1 : 4 = x : .994.07$; whereby we find that $x = 248.51$ millimeters.

Let us assume a different proportion of teeth for the above mentioned train. In place of the center wheel, another wheel may occupy the center of the train, and the seconds hand proceed from the center of the dial. Say, the center wheel has 64 teeth; second wheel 60, and 8-leaf pinion; third wheel, upon the arbor of which is placed the seconds hand; which therefore occupies the center, has 60, and an 8-leaf pinion; the scape wheel 8, with 8-leaf pinion, and the number of oscillations is

$$\frac{64}{8} \times \frac{60}{8} \times \frac{60}{8} = 16 \times 7,200$$

Consequently, the pendulum, since its time of oscillation is only one half of that of the seconds pendulum, be $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ the length of a seconds pendulum, or 248.51 millimeters.

The third wheel, which is here the fourth wheel, makes in one hour $64 \div 8 \times 60 \div 8 = 60$ revolutions, each one in a minute. The wheel must have 60 teeth; it progresses one tooth each second.*

CALCULATION OF THE MINUTE WORK.

The third part of the train is generally placed between the front plate and the dial. The requisite wheels are called minute wheels. In common clocks we find three: The center wheel, the hour wheel, and the minute wheel. The center wheel is fastened with its canon upon the prolonged arbor of the center wheel, thus, however, that while it is carried along by the arbor, it nevertheless is movable independently, to permit the setting of the hands. Upon the canon pinion sits the minute hand. The hour wheel sits with a canon upon the canon pinion, upon which it must run smooth and easy. Upon the canon of the hour wheel is placed the hour hand. The minute wheel lastly, has its place near the center wheel, so that the teeth of both engage into each other; consequently it is driven by the latter. A pinion upon whose arbor the minute wheel is fastened, drives the hour wheel. We see by this that the minute wheel is necessary to establish the connection between the minute and the hour wheel. It

must run smooth and easy between the bridge and the plate. The proportion of size and the number of teeth of these wheels is conditioned by the fact that the hour wheel must make one revolution, while the center wheel makes twelve. If this, therefore, has 24 teeth, and the minute wheel also, both wheels accomplish their revolution at the same time, and it is necessary to use a proportion in the number of pinion leaves of the minute wheel and the teeth of the hour wheel, proportioned as 1 : 12; for instance, a 6-leaf pinion in the minute wheel, and 72 teeth in the hour wheel.

Preferable to the common disposition, by which the hour canon turns upon the canon pinion, is the one when a bridge is placed upon it, with a canon which surrounds without touching it, upon which the hour canon moves free and smooth. This bridge canon is to be turned in the middle, that the hour canon does not rub upon it with its entire inner surface.

If the number of teeth of two parts have been given, the proportional number of teeth of the two other parts may be ascertained therefrom.

Law. The number of teeth of the hour wheel, multiplied with that of the minute wheel, is twelve times as much as the number of teeth of the center wheel, multiplied with that of the pinion leaves of the minute wheel. For instance, the hour wheel has 32 teeth, and the center wheel has 10. The question is, how many teeth the minute wheel and its pinion can have, $32 \times x : 10 \times y = 12 : 1$; therefore,

$$\frac{32x}{12} = 10y; 32x = 120y; x = 3\frac{3}{4}y.$$

As the number of the minute wheel teeth have been expressed by x , and the leaves by y , we have found the proportion of the two unknown quantities, to wit: 1 : $3\frac{3}{4}$, or 4 : 15, or 8 : 30. Choose the number of teeth thus that a fitting proportion is obtained in its dimensions.

How many teeth can the hour wheel, and how many leaves may the minute pinion have, if the center wheel has 16, and the minute wheel has 32 teeth? Let us express the number of the hour wheel teeth by x , those of the minute wheel by y , and we have the proportion, $32 \times x : 16 \times y = 12 : 1$;

$$\frac{32x}{12} = 16y; 32x = 192y; x = 6y.$$

The proportion of the number of the hour wheel teeth to that of the minute pinion would therefore be, at the same time have a good proportion in the dimensions, as 48 : 8. If of three parts the number of teeth is known, it may be calculated how many teeth the fourth must have. For instance, the center wheel has 30 teeth, the minute wheel 45, and its pinion has 8 leaves—how many teeth must the hour wheel have? $45 \times x : 30 \times 8 = 12 : 1$;

$$\frac{45x}{12} = 240; 45x = 2,880; x = 64 \text{ teeth.}$$

Else multiply the number of the center wheel teeth with that of the leaves of the minute pinion, and multiply the product by 12; divide this by the number of the minute wheel, and you have thus found that of the hour wheel teeth, $30 \times 8 \times 12 = 2,880 \div 45 = 64$ teeth.

How many teeth must the center wheel have, if the minute wheel has 30, its pinion 8, and the hour wheel has 32 teeth? $32 \times 30 : 8 \times x = 12 : 1$;

$$\frac{960}{12} = 8x; 960 = 96x; x = 10 \text{ teeth. Or, } \frac{32 \times 30}{8 \times 12} = 10 \text{ teeth.}$$

How many leaves has the minute pinion, if the center wheel has 12, the minute wheel 24, and the hour wheel has 48 teeth? $48 \times 24 : 12 \times x = 12 : 1$.

$$\frac{1,152}{12} = 12x; 96 = 12x; x = 8 \text{ leaves; or, } \frac{48 \times 24}{12 \times 12} = 8 \text{ teeth.}$$

*A table of pendulum lengths was published several months ago in THE JEWELERS' CIRCULAR.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Nineteenth Discussion.—Communicated by the Secretary.

(Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and head them "Secretary of the Horological Club." Forward the envelopes to D. H. Hopkinson, Esq. Write only on one side of the paper, state the points briefly, mail as early as possible, as it must be received here not later than the eighth day of the month, in order to be discussed and reported in the CIRCULAR for the next month.)

HARD-SOLDERING DIAMOND SETTINGS.

Secretary of Horological Club:

Will some of the members tell how to proceed in case I wish to make a spiral stud from a diamond tail-pin? Shall I remove the diamond from the setting, or shall I do the hard-soldering with the diamond in?

J. D. H.

Mr. Rolliver said: If you can see the back of the diamond, that is, if it is not set close, it will not hurt to make the stone hot; but let it get cool without putting it in water. You have to use McLane's Anti-Oxidizer on the gold, so that the gold under the stone will not become tarnished.

DRAWING AN ENGLISH LEVER ESCAPE WHEEL.

Secretary of Horological Club:

I have an old English lever watch with 30 teeth on the escape wheel, with common stride. The lever is lost. Will you please inform me of the mode of drawing such an escapement out, as I shall have to make pallets to suit? Or is there any such pallets in the market? By giving the desired information you will greatly oblige an old subscriber.

J. M.

Mr. Uhrmacher said it would be useless to try to buy the pallets and lever ready made, as one would need a great assortment to select from, and even then he would stand a poor chance to find what he wanted. It would be impossible, in the space allowed for our Proceedings, to give directions for drawing out such an escapement, and engravings would be needed to properly illustrate the description. If Mr. M. has the back numbers of THE CIRCULAR, he should read the Practical hints on Watch Repairing, in which Excelsior treated on the detached-lever escapement, where he will find all the information necessary. If he neither has nor can borrow those articles, he will find directions in Sannier's Treatise on Modern Horology, price \$13, or Grossmann's Treatise on the Detached-Lever Escapement, price \$4. Both can probably be ordered from THE CIRCULAR office. But the least troublesome course will be to send the movement to some New York firm which does such work for the trade, and have a lever made to fit. Several good workmen are usually advertised in the columns of THE CIRCULAR, and may be corresponded with in regard to terms, etc.

AMOUNT OF SILVER ON A "SINGLE PLATED" SPOON—NON-CORROSIVE SOLDERING FLUID WANTED.

Secretary of Horological Club:

Will you please inform me through THE CIRCULAR how many grains of silver should be deposited on a common teaspoon for a "single plate," and how long, with ordinary wear, will single plate last? Can someone tell me of a soldering fluid that will not corrode every steel tool that comes in contact with it, and give the recipe for making?

SUBSCRIBER.

Mr. Electrode replied that single plate tea spoons have 6½ grains of silver on each spoon. Table spoons have double that amount. There is no soldering fluid made without acid, and acid will corrode steel—therefore keep the acid away from the tools.

SINGULAR FRACTURE OF A MAINSPRING.

Secretary of Horological Club:

We have just found what, to us, is a curiosity, viz., a mainspring, broken in the barrel in seventeen pieces. It rests in such a peculiar shape, and having had an experience of fifty years at watchmaking, and never seen anything like it before, we thought it might be interesting to you, and perhaps to some of your readers, if we should send it. The movement is an American Watch Co., Broadway, No. 1,249,891, a new one, and this is the original spring.

Respectfully yours,

J. E. B.

Mr. Horologer remarked that similar breaks were occasionally

found, but seldom so symmetrical as this, which showed a radial passage through all the coils of the spring, each coil being fractured in such a way that the ends of the pieces formed two straight parallel walls, about ¼ inch apart. He had had an instance where there was a passage about ¼ inch wide through all the coils and the walls straight, but not pointing towards the center of the barrel, but obliquely. He had also seen one or two cases where the broken ends formed a straight wall on one end of the passage, while the other wall was irregular and without any particular design or arrangement that could be perceived. There is a good deal of mystery about mainspring breakages, and although many theories have been advanced, some reasonable, and others very fantastic and far fetched, much yet remains to be accounted for.

HOW TO MANIPULATE THE MAINSPRING.

Secretary of Horological Club:

In the October number of THE CIRCULAR, "52," in attempting to enlighten J. S. in "the best way in detail to treat the mainspring," is certainly amusing, if not instructive. "52" comes very near making known at least one good way to clean (treat) a mainspring. He then, in my opinion, spoils the subject by his manner of replacing the spring: "With his fingers, and using no oil on the spring, the exact number of turns or parts of turns the spring is set up, etc." But as Mr. McFazeer fully answered the latter proposition of "52," "I will pass on, and by your permission, give my mode of cleaning, replacing and oiling a mainspring, from an experience of thirty-seven years at the bench, by the side of a number of experienced workmen from Washington City, Baltimore, Philadelphia and New York. Taking a watch that has run twelve months or more, after taking the watch down (apart), I first examine the mainspring, by taking off the cap (head) of the barrel, carefully releasing the arbor, then, holding the barrel in left thumb and fingers, with small, round nose plyers lift out the inner end of the spring, holding the thumb and fingers in such a manner as to allow the spring to uncoil itself out of the barrel in a gentle manner into the hand; and if sound and of the right strength, I proceed to clean it with a piece of domestic, (Yankee muslin—a piece of your old worn-out shirt, if you please, after a thorough washing—this being soft and free from starch and all other foreign matter calculated to injure steel). Holding the coil or rag in the left hand, the spring in my right, just as it comes out of the barrel, gently moving it back and forth, holding two or three of the coils between the thumb, first and second (middle) fingers, pressing the coils slightly over with the ball of the thumb, (not nails,) so as not to materially change the natural curvature of the spring in any way during the operation. In this way the entire spring can be cleaned, with the exception of a small portion of the inner coil, which can be cleaned by using a corner of the rag, applied with a piece of peg-wood, or by a slight brushing with a brush used for like purposes. For appearance sake, if nothing else, use the winder in all cases, and allow the *biscuit makers* to use their fingers. A first class spring (and no watchmaker should use any others if he values time and reputation,) thus cleaned, with proper space in the barrel, and with the arbor free, of proper size, and a liberal application of Kelly's Watch Oil, but not flooded with it, turned up to its proper capacity, will give out its full force for one or two years at least, without breaking, rusting, or becoming gummy and foul.

Should this be so fortunate as to find its way into the columns of THE CIRCULAR instead of the waste basket, it may be the means of stimulating an effort in vindication of that oft abused and unsettled question, to oil, or not to oil, a ruby pin.

If satisfactory to you, for the present I will don the *nom de plume* of "57," as that will be exactly my age on the 4th prox. "57."

Mr. McFazeer remarked that the method described by "57" was the one followed by a large share of the best workmen, yet others equally good followed the method of "52," which "57" denounces. In practical matters there are always great differences of opinion on many points, and there may be great differences in methods of practice, and all be good, so that it is a bold step to say that any particular mode is positively and absolutely the best. Workmen who are equal to any, often put mainsprings in with their fingers. The proper test is not "for appearance sake," but how can we do this or any other job most easily and quickly, and at the same time in such a manner as will be best for the watch. We are glad to receive descriptions of all sorts of ways of working, and discuss them in a friendly spirit—leaving our readers to judge for themselves, after hearing all

sides, which will best suit their cases. We should of course be pleased to read the views of "57" on the subject of oiling the ruby pin.

COINCIDENT VIBRATION OF PENDULUM BALL AND WEIGHT—DEVICE FOR TIGHTENING RUBY PINS.

Secretary of Horological Club:

I have a large "gridiron pendulum" Swiss regulator, with about a thirteen-inch pendulum ball, and a cylindrical brass weight suspended by cord in the usual manner. Upon the weight descending to a certain point a little below the center of the pendulum ball, the weight participates of the oscillating motion of the pendulum, except that it is bent in a direction nearly at right angles to the oscillations of the pendulum, and continues to vibrate only while the weight moves about an inch of its downward course. Will you be kind enough to explain the cause through your Proceedings?

I have so frequently seen watch repairers, every time they wished to tighten or reset a ruby pin in a lever movement, remove the roller from the staff, heat it in the alcohol lamp until the shellac was softened, and perhaps the roller blued and disfigured, besides losing the entire adjustment and injuring the time-keeping qualities of the watch, by replacing the roller without the aid of a beat-block, that I offer a simple little device which may be useful to some of your readers. Take a piece of medium-sized pin wire, about two and a half inches long; anneal about one-half or three-quarters of an inch of each end, then bend into the shape of a shepherd's crook, hammering the open end flat, and it is ready for use. Holding the ball between the roller table uppermost, now heat the hook and place it carefully around the staff body underneath the roller table. You will find it will communicate sufficient heat to the roller to soften the shellac, and no other part of the balance, staff or spring will be sufficiently heated to damage them in the least, while the ruby pin may be readily and easily adjusted to its proper position. J. W. C.

Mr. Regulator explained the device, as a piece of wire with a ring on each end—one ring being open wide enough to admit of passing the staff through the space.

The cause of the vibration of the weight was probably the slight puff of air thrown against it by the ball in passing; and the length of the cord, from the point of suspension down to the weight was such that the period of vibration of the weight exactly coincided with that of the ball. The puffs of air, therefore, came just often enough to start the weight and add little by little to its motion, until its swinging was noticeable. But if the cord should be longer or shorter, the air puffs would no longer assist each other and accumulate their impulses against the weight, but they would come at the wrong time, interfere, and neutralize the tendency of the weight to vibrate, except while the cord was of the suitable length.

WOOD CHARCOAL WHICH WILL NOT AND SNAP CRACK.

Secretary of Horological Club:

Can you inform me by return mail the kind of charcoal to use, from which no sparks will arise? If you know of any kind of wood charcoal in use answering the above, please send me word. J. S.

Mr. Rolliver answered that charcoal made from such wood as oak, or any coarse-grained wood, will snap and crack. Get close, fine-grained, soft wood coal, and it will not. If you want to be very sure, make the coal very hot in an oven, or by blowing a flame upon it with a blowpipe—that will take all the snap out of it.

MAKING A REGULATOR.

Secretary of Horological Club:

Following is a description of a regulator, made by myself, which I send to you for publication, provided you think it possesses sufficient interest to merit a place in the columns of your excellent journal. I doubt if there is another clock in existence possessing all of the features and good qualities of this one, that was made with as small a number of tools.

The case is black walnut, standing $\frac{3}{4}$ feet high, 3 feet wide at the base, and 10 inches deep from glass to back. The dial is 17 inches in diameter, and is surrounded by a black border 2 inches wide, on which are 31 gilt figures for the days of the month, which are indicated by a gilt hand, fastened to an arbor that passes through the minute hand arbor. On each side of the center of the dial, are openings, at which the days of the week and the months appear in their order, in gilt letters. The hour hand has a circle to itself above the center of the dial, and the second hand is below the center.

The movement has two striking trains—one to strike the hours, and repeat each hour at its quarters, and the other to strike the quar-

ters on two gongs. Each train has its own plates and pillars, so that it can be removed without disturbing the rest of the movement. The main wheel of time train is $\frac{5}{8}$ inches in diameter, and has 168 teeth. The center pinion has 14 leaves, and the other pinions in time train have 12 leaves each. All the pinions are cut from solid steel, tempered and polished, and all the wheels are fastened to their collets with screws. The pivots of the three main wheels run in tempered brass bushes fastened into the plates with screws.

The escapement is Denison's double three-legged gravity, and is on the front of the movement. The pivots of scape-wheel and of the pallets run in third-wheel American watch jewels. The pendulum beats seconds, and has a compensation rod of steel and brass, and a lead bob weighing 14 pounds, and all vibrations, $2\frac{1}{2}$ degrees on each side of zero. The time weight weighs 9 pounds, and has a fall of $\frac{1}{2}$ inches per day. The calendar is self-changing, and discriminates between the long and short months, including February of leap year.

The teeth of the twenty-six wheels and the leaves of the ten pinions were cut on an engine, (made by myself of wood, brass, and steel), and round-d up by hand with a file, and smoothed with emery and oil. All of the turning was done on an American lathe of the smallest size. There are 204 steel screws used in the movement.

The clock presents a finer appearance and keeps as good time as one that would cost \$200 or \$300, and as an advertisement it has done me a great deal of good. I would suggest to ambitious young men about to embark in the repairing business, that nothing will give them a reputation quicker than the exhibition of some such specimen of their handwork. This I know from experience, my watch work having doubled since the clock was finished; and it has become the regulator of the town. W. S. S.

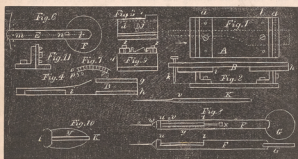
Mr. Clerkenwell endorsed Mr. S.'s closing advice, and added that there was no better way to test and perfect our knowledge than to put it into practice. Such jobs learn one many things he would never have thought of by merely studying books, and they impress the knowledge more firmly in the memory than is possible in any other way. Besides this, all young workmen have plenty of unoccupied time, which must be spent either in some such work or wasted in idling around. They can, by utilizing spare hours, make a great many things which they could not afford to buy, and would otherwise be forced to do without. But probably the greatest benefit to be derived from such labors is the habit of keeping busy. An idle man soon becomes lazy and shiftless, and a shiftless and indifferent man is invariably a botch, no matter where he learned his trade or what opportunities he may have enjoyed. Let the young workman learn, above all things, to keep busy either in studying about his trade, or in practical efforts to improve—even if he has to do work for which he gets nothing at all. He will find it harder to overcome the indisposition to exert himself, which arises from idle habits, than it was to learn his trade—and few ever do overcome it when it has once fairly fastened upon them. We therefore heartily endorse Mr. S.'s advice, and say by all means let young workmen follow his example.

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

THE arrangement for grinding the step-shaped pieces of the micrometer callipers is shown in Fig. 1, and consists of a flat piece of No. 8 or 10 sheet brass, 2 by $4\frac{1}{2}$ inches. This plate has attached to it two pieces of brass bent at right angles, shown at *a*, *b*, Figs. 1 and 2. Fig. 1 is a plan and Fig. 2 a side elevation. These bent pieces are of No. 10 brass, and before bending should measure 1 by 2 inches; and bent to a right angle through the middle in the direction of their length. These pieces are fastened to the bed plate *A* with a screw, and two steady-pins to each piece. The top edges of these pieces are ground flat and true on your ground glass slab. A piece is shown in dotted lines at *d*, Fig. 3; this pin is notched at *c*, and is attached to *b* with the screw *j*, which is tapped into *a*, and works in a slot in *d*; a thin washer of brass should go under the head of the screw *j*; the piece *d* and screw *j* is shown also in Fig. 2. The remaining piece of this machine is shown at *B*, Fig. 4; this does the grinding. It is made of No. 8 sheet brass, and should be $\frac{5}{8}$ inches long, $\frac{3}{4}$ wide at one end, and $\frac{1}{4}$ at the other. Fig. 5 is an edge

view of the same; the pieces g, h , are brass $\frac{3}{8}$ square and $1\frac{1}{2}$ inches long, soldered to B ; the piece i is the same size but made of bell metal, and also soldered fast. The face of these pieces should be filed flat and brought to a true surface on your ground glass, that is, the face of all these pieces should touch at once. Now if B is placed on A , Fig. 1, as shown in the dotted lines, it will be in position for grinding; the two pins g, h , resting on a , and the bell metal pieces on b . If the step-shaped piece is placed on the edge of b and clamped, as shown in Fig. 8, (which is a view of b as if seen in the direction of the horizontal arrow in Fig. 1), it will be ready for being ground as soon as the loose piece d is adjusted to the right height; this is done as follows: The step-shaped piece is placed on b without clamping, and we are arranged to grind the lowest step; the piece d is raised above the edge of a , until we would judge it to be the same height as the step to be ground; the screw k is run down until i will not sink on the removal of the step-piece; this, (the step-piece) is now tried under the edge of h and g on top of a , and if it just goes



under, let the screw k be retracted a little and oil-stone dust and oil applied to the bell-metal piece i ; keep g pressed against the notch guard e , and i pressed against the rise in the next step of the step-piece, and you see that the step must be ground flat and true. When ground within three degrees on your callipers of the right height, wash off the oil-stone dust and substitute Vienna lime and alcohol, and with this bring it to the right size. The inside of the piece f , in Fig. 1, (see Oct. number) can be ground on this instrument by filing out a piece of brass as shown in Fig. 11, (present number) and screwing the brass piece to b with one of the clamping screws s ; i can be used to grind and polish it until it exactly corresponds to the step-shaped piece; this can be ascertained by smearing a little oil and lampblack—coal-oil smoke or gas smoke—on the surface of the step. There should only be enough oil and black on to stain the surface and move the step a little back and forth under the piece f , (Oct. number). The piece d can be turned a little on the screw j , until the piece f is as it should be. The slot in the piece d allows it to be raised to the proper length to grind all the steps which are only repetitions of what has been described. The instrument or tool just described, is useful for grinding and polishing dentists to chronometers, scape-wheels to ditto, also the teeth to very fine stem-winding wheels, but this will be described as needed in the progress of these articles. The dial for the callipers can be made of silver, or what is better, 9 or 10 karat gold. The size of the dial should be $\frac{3}{8}$ of an inch in diameter, and to divide it take a piece of three-ply Bristol board. Drill a hole in the center of your dial the size of a No. 10 sewing-needle; cement your dial on to the center of your sheet of Bristol board with lathe wax, and with a pair of dividers set one leg in the hole in the dial, and sweep a circle 10 inches in diameter; divide the circle into 25 spaces, and then these spaces into 10 parts. Now you have your 10-inch circle divided into 250 degrees or spaces; next take a piece of $\frac{1}{2}$ -inch clock spring $5\frac{1}{2}$ inches long, soften it and draw a straight line lengthwise through the center as shown at E , Fig. 6; on this line drill two holes 5 inches apart as shown at L, M . These holes should just admit a No. 10 needle, (same as the hole in the dial). At n is a hole with one straight side, the straight side being on the line E ; this hole is supposed to lie over the outer

edge of the dial shown at F . If the 10-inch disc of Bristol board is laid on a wooden one, and a No. 10 needle put through the hole L in the piece of main spring, and also the hole in the center of the dial F , the hole m will correspond with the 10-inch circle; and another No. 10 needle if put through the hole m , can be made by using the spacings of the 10-inch circle into a cheap sort of dividing machine. We will suppose that the two needles are in the holes L, m , and the one in m is also in one of the pricks made by the dividers in spacing the 10-inch circle, and the two needles well pressed into the wooden board to hold things steady; we take a rather thick edged knife, and, guided by straight edge of the hole n , cut a short straight line on the dial F . Repeat this until you go around the dial (turn the dial and card, letting the piece E stay as first used), and you have your $\frac{3}{8}$ dial divided into 250 spaces. Take the dial off the Bristol board, and with a stiff, strong piece of dividers, sweep to circles as shown at a, p , Fig. 7, and with a fine gauge every ten spaces, extend the short lines as shown at 10 and 20 . The figures should be engraved on the dial, and the burr raised by the knife point ground off with a piece of charcoal and water. The dial needs no further polishing; it should be secured to the callipers with two screws. The distinctness of the figures and spacing lines on the dial can be increased by rubbing in printers' ink and not cleaning off the surface until the ink is quite dry. Use the charcoal and water to polish off the dry ink which is not in the lines. A cheap, accurate and simple gauge is shown at Fig. 8; this is for measuring the holes in jewels. It is made of a piece of hollow brass bushing wire, about $\frac{3}{8}$ of an inch in external diameter, and the hole in it should be about $\frac{1}{8}$ of an inch in diameter. A piece of small steel wire of such a size as will go easily into the hole of the brass bushing wire and two inches long, should be hardened and tempered to a spring temper. One end of the steel wire should be turned to a long slim taper, as shown at s ; the small end of the tapered part should measure about $\frac{1}{16}$ of an inch on your callipers, and the larger end $\frac{1}{16}$ of an inch; this will give a range equal to all ordinary pivots. Two more of these gauges with larger sized tapers—the tapers can be longer as they are much stronger than the one shown—these gauges will give you all sizes of holes from the smallest pivot hole to a fuzee arbor. In turning such a taper, an American lathe is much the best; the piece of steel should protrude from the split chuck the whole length to be tapered, i. e., $\frac{3}{4}$ of an inch; to stiffen the wire for turning, black or lathe wax can be applied, as with a wax chuck. In Fig. 10, N represents the wax K the vise; the wax can be turned away as the wire is turned to the right size; the size can be determined by your callipers. The brass bushing wire is filed a little more than half way from t to u , which is a little over $\frac{3}{4}$ of an inch in length. Through the wire K goes a pin shown at v , the large end of this pin serves to push out or in the taper s , by applying the nail to it, while the other end serves to point out the size from the graduations made on the flattened surface at y . At x is shown a light, weak spring, the end of which rests on K , and exerts a slight friction. At one end a round pin of sheet brass is inserted (and soldered), as shown at G ; this serves as a handle; at w is a bush inserted in the end of the bushing wire (F), with a hole through it of the same size as the largest part of the taper s . When the pin v is drawn back against t , the point of s will be just even with w . To use this gauge the taper s is thrust out, and the end (o of s) inserted in the jewel to be measured. As soon as this taper s reaches the correct size, K slides back into F , and you read off the size of the hole from y . But to make sure apply the callipers close to w , and read from the calliper dial.

Several years ago Bronze remains were dug up in the island of Funen, Denmark, but no one knew what had been their use. Later Dr. H. Petersen was fortunate enough to find under the earth in Jutland what he considers to be a state carriage of the fourth or fifth century. It has ornamental wood-work. On the wheels were bronzes just the same as the ones discovered in Funen.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box 4001, P. O., New York*, or the office of THE CIRCULAR.

At the regular meeting of the Executive Board, held on November 4th, ninety-six (96) applications for membership were received and acted upon in detail, requiring a continuous session of from 6 o'clock to 10:30 o'clock, P. M., and being the largest number considered at any one session since the founding of the League. Of that number, six were rejected, eleven were tabled for investigation, and the following named (79) members were admitted:

From New York City, Wm. T. Spence, John C. Proydman, Wm. E. Marcus, M. Rubenstein, A. L. Leonard, Alonzo Schwartz, George H. Kenne, Chas. E. Talbot, D. Untermyer, Thos. H. Worrell, Louis Kahn, George B. Jaques, Adolph Goldsmith, George A. Gardiner, Isaac W. Friedman, Wm. N. Evans, Isaac W. Cokefair, Wm. H. Brown, Nicolai Anderson, Otto Andersen, Meyer Baum, S. Brunswick and Otto Zamow. From Brooklyn, N. Y., Edward W. Halpin, John Gewehr, William Scheer and C. Sandberg. From Newark, N. J., A. J. Cadmus, Chas. Hartdeggen, Eugene Unger, Herman Unger and Wm. F. Weber. From North Attleboro, Mass., Alex. Austin, J. G. Cheever, Wm. E. Smith, Fred C. Somes, E. F. Whitney and George B. Whitney. From Philadelphia, John A. Lane, Adolph Lehrfeld, Alonzo F. Martin, Westford Warner and Gustav Kunz. From Chicago, Ill., Gilbert M. Steeze, H. J. Freund, R. H. Elliot. From Louisville, Ky., H. T. Esterle, George Wolf, W. J. Kriel and Wm. C. Kendrick. Albert E. Johnston, Mott Haven, N. Y.; Andrew Paul, Boston Mass.; George R. Adams, Attleboro, Mass.; Alfred Wenzel, Jersey City Heights, N. J.; Chas. F. Egler, Jr., Hoboken, N. J.; Wm. J. Alrich, Elkton, Md.; J. W. Beach, Meriden, Conn.; John W. Roberts, Jr., Pittsburgh, Penn.; Edward H. Hohl, Mauch Chunk, Penn.; Edward P. Geery, Elgin, Ill.; Otto E. Curtis, Decatur, Ill.; Albert P. Parsons, Lena, Ill.; Wm. Nethercot, Evanston, Ill.; John W. Hope, Knoxville, Tenn.; Jesse M. Fulgham, McKenzie, Tenn.; Julius A. Daniels, Anderson C. H., So. Ca.; Thomas H. Theus, Savannah, Ga.; David McConaghay, Alexander City, Ala.; Chas. W. Leslie, Mobile, Ala.; Silas H. Clausin, Dennison, Iowa; George A. Case, Ida Grove, Iowa; Harry Sandham, Corsicana, Texas; Fred W. Pitschmann, Brenham, Texas; George E. Cook, Sherman, Texas; Wm. H. Thorp, Beaver Dam, Wis.; Frank L. Sherman, Beloit, Wis.; H. Neuberg, West Bend, Wis.; Harry E. Smith, San José Cal.; C. S. Saxton, Bradford, Pa.

These accessions make the full membership at this time 1,517. The General Fund amounts to \$2,603.38. \$27.18.90 has been paid to the beneficiary of Samuel Strauss, following assessment No. 7.

The requests of five members were granted for change of beneficiaries. At this season it is interesting to note the number of young men whose beneficiaries have been recorded as "Miss Mary Dash—friend," now requesting that the beneficiary be changed to "Mrs. Mary Blank—my wife," and the grim benedictions of the Committee, with a far away look in their eyes, and with recollections of their own honeymoons, pensively note that the requests be granted.

The labors of the officers are occasionally lightened by the receipt of letters from the members, of which the following is an example: Springfield, O., Oct. 15, 1881.

MR. WM. L. SEXTON, Sec.

Dear Sir:—I had about come to the conclusion that you had forgotten me, so much time having elapsed since last assessment. We are certainly exceedingly fortunate. I know of similar institutions whose death rates are five times in excess of our own. Permit me to congratulate and thank you with other officers, for the very satisfactory manner in which you have conducted the affairs of the League. I regret that I have not as yet been able to send in my names. I have, however, sown some good seed, which I think has fallen in good ground, and have no doubt will in due time, spring up and bear fruit.

Very truly yours,

* * * * *

It is very gratifying to be able to record the favor with which the scheme of relieving the Trustees of the balance of the Chicago fire fund, has been met by the liberal minded members of our trade who were subscribers to the fund originally. By the gift of their interest in it to the permanent fund of the League, they show that the same broad-minded views of the usefulness of the League to the trade prevail with them now, and are characteristic of them in their business careers. The prudent business man looks to the future as well as to the present dollar, and the prudent tradesman as a class look as well to the future as to the present condition of their trade. A few dollars donated now will be appreciated by the members of the League, (who, to the number of nearly 1600, are located in every section of this broad land) and will assist them in their efforts to avoid in a coming, or perhaps in the present generation of jewelers, the sad spectacle of once reputable merchants being buried, and doctors' bills paid by blatant charity.

This subject is fully discussed in our editorial columns, to which we here invite attention and perusal.

The following are the names of those who, in the order named, have executed the papers necessary to transfer their interest in the unused balance of the Chicago fire fund to the Jewelers' League, for its benevolent purposes, and it would seem as if some of the old merchants had risen from their graves to bestow their silent blessing upon the League.

Colby & Johnson; Cox & Sedgwick; Hayward & Briggs; Miller Bros.; Wheeler, Parsons & Co., (now Wheeler, Parsons & Hayes); Palmer & Capron; D. Bruhl, (now D. & M. Bruhl); Hodeppl, Tunison & Shiebler, (now Hodeppl, Tunison & Co.); Brainerd, Goddard, & Steele, (now Brainerd & Steele); S. M. Lewis, (now S. M. Lewis & Co.); J. W. Pooler & Co., (now Courvoisier, Wilcox & Co.); Henry Ginnel; Estate of Paul A. Brez; J. D. Brez; Vulcanite Jewelry Co.; Brown, Cook & Co., (now Cook, Groeschel & Co.); L. Strasburger & Co.; Th. Bloch & Bros., (now Bloch Bros.); J. W. Johnson; J. M. Morrow; L. M. Kahn; Brooklyn Watch Case Factory; Lincoln, Tift & Co.; Joseph Fahys; T. B. Byner & Co.; Julius Levin; F. J. Brailard; H. E. Droz; J. A. Abry, (now C. I. Abry); Fellows & Co.; Henle Bros.; F. Kroeber; Cooper, Fellows & Co.; A. Wallach & Co.; Geo. O. Street & Son; Hessels & Ludeke; Freund, Goldsmith & Co.; Geo. W. Pratt & Co.; H. F. Barrows, (now H. F. Barrows & Co.); Estates of L. Durr & Bro.; and Smith & Hedges, (now Wm. S. Hedges & Co., and Alfred H. Smith & Co.)

We wish these names could be printed in gold and placed in the shop, office and store of every member in the land. In addition to these, over twenty others have formally signified their wish to contribute their shares, but have not yet had opportunity to do so in the legal form, and letters to the same effect are being daily received from the members who have presented the matter to the subscribers, a list of which we published complete in our last issue. The President is very cheerful over the deep interest which has been evinced by the activity of the members, and with such a corps of stalwart workers and willing donors the work is going on. We shall continue to publish in this column the names of the donors, as the legal papers are from month to month executed, and suggest as a fitting tribute to the donors, that when the whole matter is concluded, their names be enrolled as "Patrons of the League," and printed with the annual reports each and every year.

There has been a desire expressed by members of the Jewelers' League that a badge should be prepared to be worn by members. Several designs have been presented, but none have met with entire approval. We present herewith an illustration of a design prepared by a member of the Executive Committee, and would like members to favor us with their opinion, regarding its adoption as the standard badge of the League.



The Oldest City in the World.

DAMASCUS is the oldest city in the world. Tyre and Sidon have crumbled on the shore; Baalbec is a ruin; Palmyra is buried in a desert; Nenevah and Babylon have disappeared from the Tigris and the Euphrates. Damascus remains what it was before the days of Abraham—a center of trade and travel—an isle of verdure in the desert; “a Presidential capital;” with martial and sacred associations extending through thirty centuries. It was near Damascus that Saul of Tarsus saw the light above the brightness of the sun; the street which is called Strait, in which it was said “he prayed,” still runs through the city. The caravan comes and goes as it did 1,000 years ago; there is still the sheik, the ass and the water-wheel; the merchants of the Euphrates and the Mediterranean still occupy the streets “with the multitude of their wares.” The city which Mohammed surveyed from a neighboring height, and was afraid to enter “because it was given to man to have but one paradise, and for his part he was resolved not to have it in this world,” is to-day what Julian called the “Eve of the East,” as it was in the time of Isaiah “the head of Syria.” From Damascus came the damson, our blue plums, and the delicious apricot of Portugal, called damasco; damask, our beautiful fabric of cotton and silk, with vines and flowers raised upon a smooth, bright ground; the damask rose introduced into England in the time of Henry VIII.; the Damascus blade, so famous the world over for its keen edge and wonderful elasticity, the secret of whose manufacture was lost when Tamerlane carried the artist into Persia; and that beautiful art of inlaying wood and steel with gold and silver, a kind of mosaic engraving and sculpture united—called damaskeening—with which boxes, bureaus and swords are ornamented. It is still a city of flowers and bright waters; the streams of Lebanon and the “silk of gold” murmur and sparkle in the wilderness of the Syrian gardens.

Guide for Watchmakers's Apprentices.

BY HERMANN SIEVERT.

[Continued from page 282.]

PINS.—All the pins in the striking part, lifting pins and others, must be very carefully fastened. A pin with an untuned shoulder will never fit as well when it is riveted with its tapering end, than one which is driven through, and which wedges itself by means of its cone form. It must be filed truly round, smooth, and only slightly tapering. The pin, however, should not be driven in directly by blows with the hammer, but set a hollow punch upon the protruding thinned end, and place the other side of the piece upon the smooth face of an anvil.

SPRINGS.—Springs used in clickwork and striking parts are often constructed in such an awkward, unworkmanlike manner, that I can do no less than to say a few words about them on this occasion.

Before all other things, it should never be stronger than is compatible with the discharge of its functions, and since this limit is often overstepped, you will often have the opportunity to improve them. A spring which is equally thick throughout its length, almost invariably bends at its hinder end, and its elasticity thus is exerted too much in one place. It is still worse when the opposite error is committed, and it is made too tapering, it is followed by the consequence that it bends too much in the center. Owing to the shorter lever arm, this bending by an equal motion of the spring at its forward operating end will be stronger, and occasions a quick decrease in the elasticity, sometimes a breakage. The true form is an insensible decrease, and well executed springs, to be found in clocks of precision, will serve you as samples.

THE GRAHAM ESCAPEMENT.—The common anchor escapement of current clocks is connected with a fault which entirely unfits it for clocks of which great precision of rate is expected. This fault consists in the already mentioned recoil of the scapewheel. This recoil

motion has as result that the pendulum cannot swing free, and it will arrive at its point of return sooner than of rights it should in accordance with its velocity. Again, the whole repressed power of the wheel operates with accelerating effect upon the pendulum, until upon the other side the operation of the recoiling wheel is repeated. You will see, therefore, that the pendulum accomplishes its motion in proportion to the power of the wheel. The least change in this power produces an entire alteration in the rate of the clock, wherefore the Graham Escapement, thus named for its inventor, is used in all clocks calculated to serve as precise timekeepers. The teeth of the scapewheel have a reversed position in this escapement, and do

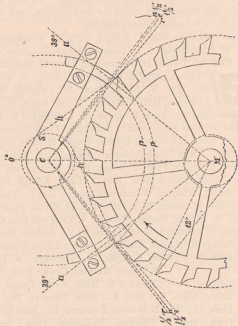


Fig. 6.

not drop against an inclined plane, but against an arc, called arc of repose, because the wheel tooth, during the continued motion of the pendulum, reposes upon it. To complete this repos, it is necessary to also make the center point of the arc of repose the motion center of that piece of the escapement called anchor.

Let us suppose that the escapement is intended for a regulator with seconds pendulum. The scapewheel shall carry the seconds hands, and must consequently make one revolution per minute, or have 30 teeth. The anchor spans over $6\frac{1}{2}$ teeth, each tooth measures 12° , which makes 78° . We first draw a center line, and describe from point *M* the outer periphery of the wheel, which, for sake of clearness, has been taken at 80 min. in this case. Upon each side of the center line we mark the half of 78° , or 39° , and denote this by the lines *a a*. Upon this we place at right angles the tangents *r r*, and thus find the motion center of the anchor, *C*. The motion of each wheel tooth at each lifting amounts to 6° , from which we deduct $\frac{1}{4}$ for the drop and the thickness of the tooth point, wherefore $4\frac{1}{2}^\circ$ remain for the thickness of the anchor pallets. We carry these $4\frac{1}{2}^\circ$ upon the wheel circumference, locating $2\frac{1}{4}^\circ$ at both sides of the lines *a a*, and through the obtained points we strike from *C* the two anchor circles *p p*.

Experience teaches that by clocks with dead-beat escapement and seconds pendulum, a moderate motion of the latter gives the most favorable results. Not less than 1° and not more than 2° lifting are taken for such clocks. Let us take the average $1\frac{1}{2}^\circ$. Moreover, the tooth, for necessary security, must fall upon $\frac{1}{2}^\circ$ repose, and thus our anchor has a totality of motion of 2° up to the drop of the tooth.

We next mark, starting at the entrance plane, from *r*, $\frac{1}{2}^\circ$ for repose, by line *m*, and from *m*, $1\frac{1}{2}^\circ$ for the lifting by line *e*. We reversely mark at the exit plane from *r*, first the lifting of $1\frac{1}{2}^\circ$

by line e , and thence $\frac{1}{2}^\circ$ repose by line n . To find the pallets, we draw the lines h h' —for the entrance pallet by the points of intersection of the line n with the outer, and those of the line e with the inner anchor circle. The exit pallet is determined by the points of intersection of line e with the inner, and of the line r with the outer anchor circle. If the drawing has been executed with exactness, both lines h , h' , determining the inclination of the pallets, must be tangents of one and the same circle, and only in such a case is the lifting equally large on both anchor arms. This circle is called the lifting circle.

The entire anchor may be made of one piece; it is easier, however, if, as is here sketched, the larger part of the anchor is of brass, and only the two pieces forming the arcs of repose and the pallets, are made of steel. These two pieces are called pallets; they are inserted in the brass part of the anchor, in a well turned-in bezel, and retained by steel coverings.

We next sketch the wheel. In the sketched position of the anchor, one tooth lies upon the outer repose; let us denote from there the points of all the teeth upon the circumference of the wheel in distances of each 12° . To prevent the corners of the inner repose from butting against the front plane of the tooth, this latter should have an inclination to the radius of the wheel of at least 10° to 12° . We denote this inclination for one tooth by a prolonged line, and draw a circle around the center of the wheel, to which it forms a tangent. We next find the requisite inclination for such tooth. The back of tooth must permit a free motion to the pallets, and the entrance pallet especially must not touch the tooth from behind. Thence is obtained the sufficiently thin form of the wheel teeth.

The anchor was allowed formerly to span over more teeth, because far longer lever arms are obtained hereby, and, as was supposed, an increase of power. This supposition is false; in order to sustain a certain quantity of pendulum motion, a determined amount of power of the scape wheel is necessary. The longer the lever arms of the anchor, the greater must be the inclination of the pallets to, with it, obtain the same degree of motion of the pendulum. Wherefore, power is not gained by longer lever arms of the anchor; on the contrary, the increased quantity of the same must be moved at the same time. Another fact has led to the choice of shorter lever arms. During the lifting, the pendulum motion is undoubtedly accelerated by the same power of the scape wheel, which exerts an equal influence by long as well as short lever arms. But the friction of the tooth upon repose, retains the pendulum somewhat, and this by so much more, the longer the radii of the arcs of repose, or the lever arms of the anchor. There must consequently be one length, where acceleration and retardation equalize each other; and experience has taught us that we obtain the right length by permitting the anchor to span over about the fifth part of the wheel. As a consequence of this arrangement, a little difference in the moving power, that is, in the power of the scape wheel, exerts less influence upon the duration of the pendulum oscillations.

A seconds pendulum with a sufficiently heavy bob will always give better results than a shorter one, because this latter is more sensitive to disturbances. Shorter pendulums require more lifting for the escapement, in order to render the short pendulum less sensitive by a larger oscillation arc.

Regulator movements with Graham escapements often have an adjustable bushing for the pivots of the anchor arbor. It is inadmissible to turn this bushing, in order to set the motion deeper or shallower, the drop being changed thereby. This adjustment is, however, a desirable means to alter the dephing distance, in order to correct a faulty drop. If the drop is right, but the tooth does not fall enough or too much upon repose, it is easily corrected by moving one of the pallets, if the anchor is not made of one piece. But if the repose should not be equal upon both sides, it is produced by the unequal inclination of the pallets, which must be corrected by some skillful hand.

The maintaining power.—To render the moving power equal, as

nearly as possible, the better class of pendulum clocks, of whom an exact rate is expected, are driven by weight. Not to cause the clock to lose time when winding it, which in common clocks would be of no significance, a contrivance is made use of, called the maintaining power. Its most essential part is a second larger ratchet, which sits loosely upon the arbor between the drum and drum wheel. This ratchet is connected with the drum by a common clickwork. The drum first drives the aforesaid ratchet, and this again presses by means of one or two springs against the drum wheel. (See further on, Fig. 12.) A long cone rests upon the large ratchet, which is fastened upon an arbor fixed into the plate by two pivots. This presses only by its trifling weight upon the wheel, and permits it to slide through from below during the going, with very small friction. The cone at winding, however, hinders any retrograde motion of the large ratchet, and annuls the further operation of this motion, which, without the maintaining power, would have as sequence the retrograde motion of the clock. By the pressure of the springs fastened at the ratchet, against the shanks of the wheel, the going of the clock continues during winding.

It is a condition that the teeth of the large ratchet be as small as possible, so that any retrogression be as trifling as possible. Also the motion of the drum wheel, produced by the pressure of the springs, must be of such an extent that the clock, even if the ratchet should almost go back by one tooth, is still impelled sufficient time by it. But before all things, neither the friction nor the power of the springs must be so strong, that both cannot be overcome by the drawing power of the weight. In such a case, the maintaining power would not operate at all. The application of light and elastic springs therefore is necessary.

The cord pulley is made use of when, as is generally the case by regulators, the height of fall of the weight is contracted. The end of the cord is fastened at a , (Fig. 7), the opposite, at c , impels the clock.

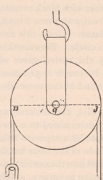


FIG. 7.

The cord pulley operates like a lever with unequal arms, with its fulcrum at a . The weight draws on the short arm a b , the arm a c , twice as long, draws the cord on the drum. The consequence is, therefore, a doubling of the motion and a corresponding diminution of power by one-half. Thus, a weight drawing on a cord pulley, must be double as heavy as a direct operating one, in order to transmit an equal power to the clock. A certain loss of power by the friction of the pulley must also be taken cognizance of. The pulley, of course, must move easily, like the wheels, and without infringement.

By regulators, the fork is provided at its lower end with a contrivance for the adjustment of the drop, to obviate the necessity, as is the case in common pendulum clocks, of bending the rod of the fork. The guiding pin, which seizes into a slit of the pendulum rod, rests with its broad part against a brass piece. The pin is retained by a screw lying parallel with the latter, and which is adjustable at the same time from the side. This arrangement very easily assumes the proportions of a source of defects; as soon as the retention of this pin by the screw is defective, a loss of power is originated, which sometimes occasions the standing of the clock. Wherefore examine carefully if the guiding pin rests firmly upon it with its bottom plane, or if it wobbles by the turning of the screw. Such a contrivance is but a very poor one at best, making, as it does, a small pendulum of the fork, and I will make you acquainted with a far better arrangement.

INSTRUCTIONS HOW TO MAKE A GOOD SECONDS CLOCK.

It is a very instructive and interesting work to make a new clock, and every master having the good of his apprentice truly at heart, will afford him time and material to make one.

Of course, the first beginning will be to draw the whole clock, and to exactly determine all its different proportions. It will be hard to

everybody to hit upon a really simple and harmonious arrangement, since good patterns are often wanting. I have thought it best for this reason, choose a pattern for drawing and description, the arrangement of which can hardly be more simple and adapted to its purpose. This is the Glasshütte seconds clock.*

DRAWING A CALCULATION OF A PENDULUM CLOCK.

The consideration of the size and arrangement of the dial, being most intimately connected with the entire movement, is first in order. I have chosen as the most suitable for our purpose a dial of 25 cm. diameter, with eccentric seconds and hour circles. It should not be made smaller on account of its distinctness. Just as little is an arrangement with seconds hands from the center to be recommended. The motion of the minute hands is obtained by depthings, followed by a shakiness in consequence of the necessary tooth shake. But the greatest defect of this disposition lies in the very injurious burthening of the scape wheel by the long seconds hand.

The arrangement of the dial may be seen in the accompanying cut, (Fig. 8.) Owing to the contracted room, one-half is only shown, and in two-thirds of its natural size. The dial is of brass, 2.5 mm.

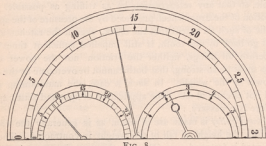


FIG. 8.

thickness, with engraved numbers, etc., filled either with black cement or niello. With the exception of a brass rim from 2 to 3 mm. broad, which surrounds the whole, the dial is silver-plated. Upon this rim are placed the minute numbers, and the minute circle. Between this and the center, the seconds circle may occupy the entire space at disposal, thus receiving a diameter of 90 mm. Its center is 51.2 mm. from the dial center. Of exactly the same size and at the same distance upon the other side is the hour circle.

By this very harmonious arrangement of the dial, the dimensions of the wheels and pinions of the movement are determined to a certain degree. In order not to disfigure the plate by a separate hole for the winding square, it passes through the hole of the hour hand; whereby the depthening distance of the drum wheel into the center pinion is determined. An 8-day clock has been chosen as pattern, which is generally the rule.

(To be continued.)

Origin of the English Mile.

IN a paper recently read by M. Faye before the French Academy of Sciences, and published in *Nature*, the English mile is shown to have a very ancient origin. It was meant to represent the length of a minute of arc, based on a calculation by the Greek astronomer Eratosthenes, of the meridional arc between Alexandria and Syene in Egypt, made more than 2,100 years ago. This ancient measurement, says M. Faye, was very precise, and the English geographers of the sixteenth century were fully justified in taking it for the basis of the valuation of the arc of one minute, or the sixtieth part of a degree, and of offering it to the navigators of their country. Only they believed that the great Greek astronomer of Alexandria must have made use of the Greek foot, which is one and a half-hundredths larger than the English foot. In fact, M. Faye contends that he used the Egyptian or Philetarian foot. Hence the English mile instead of being the sixtieth part of a degree, is really the sixty-ninth part.

*NOTE.—The drawing and description of this clock has been made possible by the kindness of Mr. M. Grossmann, Glasshütte, who kindly placed the data at my disposal. Furthermore, a treatise of Mr. Ph. Völling, Jr., facilitated my labors for the practical execution of such a clock very materially. I return my thanks to both these gentlemen. —THE AUTHOR.

The Silver Certificate Mystery.

IN thirteen months the gross issue of silver certificates has increased fifty-one millions, or almost four millions a month; the net issue, forty-five millions; the holding of silver dollars eighteen and a half millions. In order to see just what this implies let us analyze the changes during the last month. The gross issue increased six and a half millions, the net issue practically the same, and the amount of silver dollars on hand has increased \$150,000. Now, if the law has been literally complied with, nearly all the silver-dollar coinage of the month has gone into circulation—say, \$2,400,000, less \$150,000; \$6,500,000 in silver dollars has been deposited in the Treasury by holders; and, the certificates having been taken away by these depositors, the silver dollars themselves have been paid out. It follows that the payments from the Treasury during the month of September have included eight and three-quarter millions of silver dollars, or two millions a week. Such a statement as that is preposterously untrue. The whole disbursements of the Government during the month were only \$13,300,000, excepting for the public debt, on which no silver dollars were ever paid; and we are forced to believe either that two-thirds of all the payments by the Treasury last month were made by the actual transfer of silver dollars, in all their bulk and weight, or that this issue is accomplished constructively—that silver dollars are not actually deposited, as the law provided and intended.

Lady Pigot's Smashed Tea-cups.

HARD times do not seem to have had much effect in diminishing the value of *patre tendre*. Corners in overstocked cabinets can always be found for what is rare and excellent; while even fragments of really fine cups and saucers are fetching as good prices, to say the least, as uncupped china of secondary quality could ever command. Recent records of the auction-room may bring comfort to the sorrowing owners of broken porcelain who have prudently saved the pieces. Henceforth, when cruel fate, personified by the housemaid, dashes to the ground a Kioto dish, a six-mark Nankin jar, a Dresden shepherdess, a Capo di Monte shell, or a relic of royal Severes, let not despair enter the bosom of the bereaved connoisseur. Lady Pigot was the possessor, among many art manufactures equally beautiful and scarce, of an old Worcester tea-service, which was occasionally in use, and which consisted of eight cups and saucers and a little teapot. One fatal afternoon the footman, in carrying out the tray with these charming objects upon it, tripped over the lap-dog, or the rug, or some unlucky impediment and sent everything flying. The effect of this awkward mishap was that the entire service, excepting one solitary cup and four of the saucers, was smashed to atoms. So hopeless appeared the wreck that, though it was carefully gathered together and preserved, no attempt was afterwards made to unite the fragments. There was nothing among them so presentable even as those "broken teacups, wisely kept for show, which on the chimney glittered in a row," as chronicled by Goldsmith in "The Deserted Village." Last week, at a sale of her ladyship's effects, the single cup and four saucers realized something over £90, while the broken pieces brought the remarkable solatium of 50 guineas.

SAYS a correspondent: A good watch oil should not become thick in cold weather, contain no acid, and not become rancid. The test for freezing is easily applied; in winter, put your oil bottle into a snow pile; in summer, into an ice box. If it remains fluid after half an hour's exposure, it may be accepted as good. The test for acids is made by litmus paper, to be had in every drug store; the blue color of the paper changes into a violet, even a red, according to the degree of acidity of the oil. The drying or rancid qualities may be determined by placing a gridiron upon a stove which is heated to about 240° F.; have a care not to let it get beyond this. The drying or turning rancid will begin in a few days, in accordance with the quality of the oil.

Fire Gilding.

[From *Journal der Goldschmiedekunst*.]

I have meditated for some time before I undertook to write the following article, deeming the subject trite and well-known; to judge by the correspondence, however, which poured upon me from all sides, since it became known that I entertained such an intention, I hold that a publication of a life-long experience in the vocation of a fire gilder will not come amiss, and I give it according to the best of my ability.

As far as regards the gilding of metals, there are several processes, such as, 1. fire gilding; 2. cold gilding by rubbing; 3. plating, divided into two sub-classes, *a*, plating by adhesive means; *b*, by soldering; 4. Galvanic gilding, also divided into two classes, the first with battery, and the second by contact. I will only elucidate the first of these.

FIRE GILDING.

This process consists mainly in the union of gold with mercury, the product is called amalgam, and is rubbed upon the article to be gilt; the mercury is afterward evaporated, and the metallic gold remains in the shape of an adhering coat. This kind of gilding, although by far the handsomest and most durable, is becoming scarcer now-a-days, for several important reasons. Fire gilding is a very costly work, and at the same time, very dangerous to health, and especially for the latter reason is the galvanic gilding far preferable. Fire gilding is best for articles of bronze or silver, less for those of copper, having less affinity for the amalgam. Iron, steel and zinc must first be coated with copper or brass, because the amalgam will not adhere to them. The procedure by gilding is as follows: The articles to be treated must first of all be *thoroughly* clean, else the gilding would either not at all or only adhere partly. By brass or bronze, it is best done by dipping; by silver, by boiling; iron and steel can be immersed in a weak solution of sulphuric acid, 1 to 10, rinsed afterward in a solution of potash, to be followed by clean water. With silver articles it is necessary to have the surfaces neither too rough nor too smooth; too much amalgam would be necessary in the first, the gold would not adhere in the second instance. I will recur to a little manipulation hereafter in the saving of gold.

We next come to the operation itself, to the so-called amalgamation. By rights, only the finest golds should be used for this purpose; the use of coined gold is always accompanied with more or less trouble; the added alloy is either copper or silver, which in either case is highly detrimental to the color, and for several other reasons, to be explained hereafter.

Let us say, a ducat (3.5 grams) of pure gold is to be used for the gilding; it is first rolled as thin as it can be gotten, then heated, in order to remove any grease, cut into minute pieces and rolled into tubes, to offer as much surface of attack as possible to the mercury, and the union is thus effected more easily. Now, weigh to the stated quantity of gold (3.5 grams) about from 30 to 40 grams, *chemically pure* mercury and add it. I reiterate by saying, use only the purest mercury; that of commerce contains foreign metals, such as tin, lead, bismuth, etc., which after driving off will show themselves in white spots, which may utterly ruin the whole work, without considering the time and gold wasted.

Next make a charcoal fire, and put the amalgam into a new Hessian crucible, having previously rubbed it well with chalk, let it come to a weak red-heat, and, when thus heated, pour the above mixture into it, put it back into the fire, but retain your hold upon it with the tongs, and shake it gently to and fro. As soon as you notice that the mercury begins to fumatize, draw the crucible out, and empty its contents into a flat vessel—sauceur, or other—with cold water, standing by you, decant, and again wash with water. Feel the mass; if it is gritty or like sand, the operation must be repeated until not a particle can be felt of the several gold grains, and the mixture is one doughy, homogeneous mass. The amalgam will be found to be too fluid, containing too much mercury, and the

most expeditious manner to separate the mercury in excess is by pressing it through soft buckskin; this is also the safe *t* of the several methods employed, because the hand of the workman does not come in to contact with the mercury. The proportions of the mass will be, when pressed, about two parts gold and one part mercury. The more imperfect the pressing, the less the percentage of gold, consequently, the thinner the coating. The voided mercury contains a trifling amount of gold, and may be used either for coating articles very thin, or reserved for future amalgam.

Before proceeding to the application of the amalgamated gold, it is necessary to also amalgamate the article. This is done by fluid, and consists of a solution of 110 parts chemically pure mercury in 121 parts nitric acid, of the specific weight of 1.33, to be dissolved without heating, and to which is afterwards added 6,000 parts rain, or what is still better, distilled water. The article to be gilt is coated over with a layer of this "quickenig water," which disposes it to take the amalgam more readily. A silver article beyond 750 parts fine, need not be thus quickened, but below this figure, it is necessary. Not to go through the lengthy process of brazing or bronzing iron or steel, the metal may be indirectly coated with mercury, by dipping it into a hot fluid composed of the following ingredients: Mercury, 12 parts; zinc filings, 1 part; sulphate of iron, 2 parts; water, 12½ parts, and muriatic acid, 1½ parts.

Articles of steel or iron are thus very quickly covered with this coat of mercury, to which gold amalgam adheres without difficulty. To apply the amalgam upon the articles, prepared as aforesaid, when they are large, is done by tipping them to one side, using as vehicle a brass scratch-brush, and fastened into a wooden handle; for small ones, use a brass wire flattened on both ends. Dip your brush first into the quickening water, then take of the amalgam, which stands by you in an unglazed earthen vessel or lies upon a stone, a sufficient quantity, and apply it to your article and endeavor to spread it on as evenly as possible. In the same manner proceed with small articles, using the flattened piece of brass wire. To spread the amalgam as evenly as possible, use a bristle brush or a rabbit's foot, and part the amalgam evenly to all sides. The degree of skill shown in this performance betrays the finished workman, because the gold coating will everywhere be uniform. For weak gilding, use in place of the dough-like mass one of less percentage of gold, which consequently contains more mercury. This application of the amalgam is done in a less ceremonious manner—the articles are put into a wooden or earthen pan containing the amalgam, and agitated, "flipped up" until it adheres everywhere. Thus covered, they are rinsed in cold water, and the mercury is driven off by gradually heating them. This operation is performed upon a gentle coal fire. For this purpose the article is laid upon the fire until it commences to smoke, then withdrawn, and to obviate breathing the noxious exhalations, keep it up high, or to one side, until the fumes have ceased. When large, the article is again tipped to one side, and belabored anew with the brush of bristles, to spread the amalgam in a uniform manner; if small, it is laid into the left hand, which is well protected against the mercury by a padded glove, and rubbed as aforesaid.

Put it back upon the fire, and repeat the same operation of dividing. Do it three or four times, until the mercury is all driven off and the gold appears. Pay strict attention to heat the article equally on all sides, by constant turning. Places wanting gold may be patched up with more amalgam, which is driven off, as described. Only chefs d'œuvres or articles demanding a heavy coat are gilt a second, third or fourth time, and the quickening water is applied each time. Small ones are treated in common, by placing a number of them into a flat iron dish, agitating it, to equally heat all the pieces.

The moment when the fumigation is ended may be recognized as well by the yellow color as by letting a drop of water fall upon the article, and it will evaporate with a loud hiss; also by the time consumed in drawing off. Experience will soon teach this. When the re-application and driving off is to satisfaction, and the article is

considered free of blemish, put it aside upon a clean place, and add a few fresh coals to the fire, to let them take fire slowly. Meanwhile thoroughly wash your hands with soap and water, to remove any adhering mercury. Take the article again and scratch-brush it well with a coarse brush, tied rather long, and beer or vinegar, then rinse it in cold water, and lay it into warm sawdust to let it dry. If it is intended to have a more reddish hue, it is treated with annealing wax; if a high gold color, it is colored with the so-called green color, to be explained hereafter. If intended to be polished, this operation is performed with a bloodstone which is dipped repeatedly into water acidified by vinegar. Wash the article again, and dry it either with a fine linen cloth or sawdust.

The above remarks constitute about the main features of the process of fire gilding. There are divers manipulations, necessary observations, conditional and other rules, connected with it; I will essay to describe them, gathered during a long experience, and will commence with the description of mercury.

[The author here enters into a lengthy essay on mercury, its place of procurement, etc., which we deemed rather unimportant to be translated. He speaks of one feature, however, and we cannot sufficiently caution the trade against the extremely poisonous effects of inhaling the fumes of mercury. It is noxious in all its forms and disguises. A wet sponge, placed into the mouth during, and withdrawn after the operation will be found full of minute particles. He recommends the use of a thinly rolled piece of gold laid over the tongue—on account of the great affinity of mercury for gold. It will be amalgamated after the operation.]

ANNEALING WAX.

It was said above, when the article is removed from the fire, it must be scratch-brushed and then rubbed with annealing wax, which when burned off, gives it the color of the 18-karat gold. There are many recipes in use, but it cannot be said of all that they thoroughly serve their purpose. Some contain too many ingredients, one of which very often either neutralizes the other, or is a detriment to the rest. I will first state my own, which I have found to be good by the test of many years of practice—*provided, however*, that the article was well treated in gilding. Should the article be thinly gilt, and this be somewhat pale, it may become necessary to anneal it twice; there is no danger that my recipe attacks the gold. It is as follows:

1. Yellow wax.....12 parts	5. Borax..... $\frac{1}{4}$ parts
2. Verdigris.....4 "	6. Bloodstone.....6 "
3. Sulphate of zinc....4 "	7. Copper scales....2 $\frac{1}{2}$ "
4. Sulphate of iron....2 "	8. Red oxide of iron. $\frac{1}{4}$ "

These different ingredients, Nos. 2, 3, 4, 5, and 6, are each by itself pulverized and sifted through a hair sieve; but when pulverizing the verdigris, be very careful to tie up your mouth and nose, it is extremely poisonous. Also the copper scales pass through the sieve.

Next mix all parts well together in the mortar, and stir them thoroughly. While doing this, the wax has been placed in a suitable copper, earthen, enameled iron, or porcelain vessel, and melted. This vessel should be of good size, as all the ingredients have to be well stirred in it. When the wax is boiling, stir the above-mentioned parts well into it; do not by any means let the matter rise, but keep continually stirring, else the weightier parts would sink to the bottom and the wax become uneven in grain. Have some forms standing near you. Whenever you think that the wax has thoroughly been stirred and is well mixed, take it off the fire and pour it into the forms, which were rubbed with a little oil to facilitate the taking out. Place them into ice-cold water, which will make the wax shrink, and it is ready for use.

As aforesaid, there are many recipes for making wax, but I can be fully responsible only for my own; not to appear prejudiced, however, I append several, as follows:

Yellow wax.....32 parts
Red bolus.....3 "
Verdigris.....2 "
Alum.....2 "

or Yellow wax.....32 parts	or Yellow wax.....32 parts
Bloodstone.....24 "	Bloodstone.....18 "
Verdigris.....4 "	Verdigris.....4 "
Copper scales.....4 "	Copper scales.....6 "
Calced borax.....4 "	Calced borax.....2 "
or Yellow wax.....96 parts	or White wax.....36 parts
Bloodstone.....48 "	Bloodstone.....18 "
Colcothar.....2 "	Verdigris.....18 "
Verdigris.....32 "	Copper scales.....8 "
Copper scales.....20 "	Sulphate of zinc.....18 "
Sulphate of zinc.....32 "	Sulphate of iron.....6 "
Sulphate of iron.....16 "	Borax.....3 "
Borax.....1 "	

I find it necessary to explain about copper scales, since they are an important feature in the wax. When they cannot be had pure at a coppersmiths, make them yourself. If they are bad they will spoil the whole work; they are sometimes mixed with lead, tin, or zinc, in which case they leave indelible white spots on your gilding; and the greatest caution is necessary to have them free from intermixture. Take a few leaves of copper, the pure metal, it must not have been tinned, about the size of a card; have a saucer of water at hand, in which a few spoonfuls of salt have been dissolved; dip the leaves into this water, then white-heat them, and quickly cool in another vessel with water standing near you; a thick layer will peel off, and finish by removing it with a brush. The plates are dried, again dipped into the salt water, heated, cooled, etc., as directed. When of sufficient quantity, pour off the water, wash the scales, and rub them fine in a mortar. You may depend upon their purity. We now come to the

COLORING.

I have endeavored to be explicit as possible to give the article the fiery appearance of 18-karat gold. It often occurs, however, that it is necessary to give it a yellow color, and the treatment is as follows:

Verdigris.....16 parts
Salt ammoniac.....12 "
Saltpetre.....8 "
Cream of tartar.....1 "

These ingredients are pulverized, put into a mortar and dampened with wine vinegar, but not too much, because they part during the mixing with their water of crystallization and become more fluid. Next rub them fine that the mass runs like a thin batter; when done, anoint the article with a brush, laying it on pretty thick, put it on a gentle coal fire until it is black, quickly withdraw it and cool it in cream of tartar water, already used.

After this coloring, it is again scratch-brushed with beer or vinegar, rinsed, and dried with a clean white cloth. If necessary, heat again hissing hot, and the operation is finished. The remaining color may be preserved in a bottle with a ground stopper, and it keeps thus for years. It only remains to say that when this method of coloring is used, the article need not be waxed, but is treated directly thus after gilding.

There are goldsmiths who desire to give an article a high fiery color, and I will give a method. Take table salt, cream of tartar, and sulphur, in equal parts, and pulverize and mix them thoroughly. To one glass of water take as much as can be held between three fingers, and let it boil in a copper vessel, taking care not to let it boil over, which may be prevented by dropping cold water into it. Tie the article to a thread and suspend it in this water for six or eight seconds, take it out and quickly immerse it in a vessel with water standing near. Examine if it has the desired color, if not, repeat the operation for another few seconds, and continue until attained. It is next dried with a cloth and afterward with heat. It may happen that a mistake occurs in the time of suspension; if left in too long, the article will become brown, owing to the sulphur; this may be corrected by dipping or boiling in alum water. I will acknowledge that I cannot conscientiously recommend this procedure; I seldom use it, and I will not tempt others to do it; the color does not last long, and the article becomes dimmed and brown.

ORNAMENTAL GILDING.

The practice of coloring gold is rather on the wane, but the freaks of fashion may introduce it at any time with greater force than ever, and it is well that the goldsmith should be prepared for all emergencies. It is necessary to say that articles intended to be gilt ornamentally must be of strong 14-part silver, as will be seen by the following:

Work destined to be in colors must be strongly gilt. Thus five colors may be had on silver, and four on copper and bronze—red, yellow, green, white and dead.

Red color.—After driving off, as explained, the article is scratch-brushed, and places intended to appear dead are covered with a dough, consisting of flour, chalk and water, in equal parts; this coating is slowly dried over the fire, also a little vessel with annealing wax, which melt. Places intended to be red are covered with the fluid wax, using a little brush; let this either burn off or evaporate, as suits your fancy. The entire work is scratch-brushed, and if the places are desired to be redder, the operation is repeated.

Yellow color.—When the places for the red have been sufficiently treated with the wax, the whole article is covered with above said dough, the red places included, except spots intended for yellow, which are left bare. These are treated with the described gold color, using a brush, afterward scratch-brushed, and the operation is finished.

Green color.—It is not necessary to cover the article for the application of this color. Places intended to be green are amalgamated again; drive off the mercury, and cool the article in a watery solution of sulphuric acid, 1 to 25. Heat it hissing hot again, cool, and the place will be green.

(To be continued.)

The Torsion Pendulum—A New Principle.

MESSRS. KNOBLAUCH & CO., of Berlin, have patented for the German Empire a new pendulum, and sent to this office a circular descriptive of its operation. The following is a translation:

The center wheel has 64 teeth, and engages into an 8-leaf pinion, n , carrying a vertical wheel, a , with 15 teeth, which operate alternately upon the pallet of verge b . It will be recognized as a new application of the old verge escapement, but as it makes only four beats per minute, its wear is very trifling. The inventor tried several escapements, but returned to the old verge, as the most suitable, successfully removing the injurious recoil, however. The verge is the most simple of all escapements, and peculiarly adapted to the rotary motion of this new pendulum.

Upon the verge, b , is driven a brass arm, c , whose vertically protruding steel pin, d , engages in the fork, e . This fork, e , is shown more fully in the figure to the right. It is screwed to the steel ribbon, g , which latter must be set in rotations, because the steel pin, d , carries the fork. The motion which the rotating disc receives after the impulse causes the disc to rotate in excess, when the fork is already in repose. The disc then returns, disengages a tooth, and the next impulse begins. The operation of the escapement thus proceeds uninterruptedly. The rotation of the pendulum extends beyond 360°, and exhibits an unusual steadiness of motion.

The movement, beside the center wheel, has three intermediate wheels, and a barrel of a size common in spring regulators. With these 5 wheels, 5 pinions, and 1 roller, it goes a whole year. The exact insertion of the fork is done by the moveable lining, A .

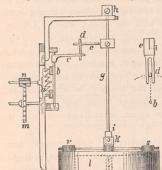


Fig. 1.

1. operation of the escapement thus

The rotating disc, l , of pressed sheet brass, has within an open castoring ring, serving the purposes of compensation. The masses, r and s , also serve for the same purpose.

The pendulum rod is a flexible steel ribbon, a thin watch spring, always remaining vertical, but coils and uncoils with each motion. The bob thus resembles a balance.

To set the clock going, fasten the disc to the lower end of the rod by pin k . For a regulator, it must be drawn through fine slits above and below of the gridiron pendulum. Next impart to it a rotating motion to any one side, until a tooth drops from the pallet. The little projection, h , should not be meddled with by the layman. Pin d must engage the fork e , else the clock cannot go.

The inventor claims superiority for his clock, first, because it requires to be wound only once a year, and, second, almost no resistance of air is offered to the vibrations of the bob.

A Review of the Different Escapements.

(Translated and compiled from the French, for THE JEWELERS' CIRCULAR.)

Roller Escapement of Mr. Brocot, Fig. 14.—This escapement is distinguished from the ordinary anchor escapement by the shape of its pallets, which are here half-cylinders, of steel or ruby. The vertical wheel teeth are cut in a manner to permit a large vibration arc. The performance of the escapement is much facilitated by the pins, which permit a certain recoil without this being accompanied by any bad effect. The arrangement of the rubbing parts otherwise is contrived in such a manner that it retains the oil for a long time.

According to the style of arrangement, the Brocot escapement is either dead-beat or recoil. In the latter instance, according to its inventor, it offers the advantage of an almost perfect isochronism, the recoil compensating the inequalities of the impulse.

Sketching the escapement.—Let us suppose that the anchor is intended to span over nine teeth, (not counting the two operating teeth) of an escape wheel of thirty teeth. We first sketch this wheel, and divide its circumference into thirty equal parts, which gives us the points of the teeth. We next open the compasses to the half of the interval between two teeth, and draw from the center i , the circle if , and from the point s , the one-half of at , the demi-circle st , which will be one of the rollers.

The anterior faces of the teeth must never be directed toward the center i , but they must be inclined backward and at tangents to the circle if , such as ts and ts' . To sketch the second roller, we must count the tenth tooth, starting from t , and through its point we draw the radius it , prolonging it by a quantity ts' , equal to the radius of the roller or the demi-interval of two teeth; the point s' will be the center of the second roller, which we thus may draw. The center of the anchor is ascertained in the following manner: With a radius equal to that of the scape wheel, diminished by the half of the radius of the roller, we describe from the center i a circle mn ; we then draw the radii is , is' , and upon the extremity of these radii we raise the perpendiculars xc , ve , tangents to the circle mn ; the point of intersection, e , of these lines will be the center of the anchor sought.

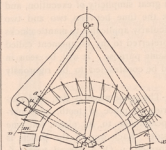


Fig. 14.

This construction presupposes that the supplementary arc be nearly equal to the roller radius; if this arc were greater or smaller, it would become necessary to alter so much more or so much less the radius of the scape wheel, to obtain the radius of the circle mn , which must always correspond to the one-half of the supplementary arc.

It will be seen that the reposes impart no motion of any sort to the scape wheel; the faces of the teeth ts , ts' (position of repose),

are in effect parallel to the radii $i s$, $i' i$, and are consequently perpendicular to the anchor arms; here the repose planes have been transported from the pallets to the wheel teeth.

Thus the following dimensions will be found for an escape wheel of thirty teeth, with a diameter of 100 mm. The anchor embraces 9 teeth, as in Fig. 14. Diameter of rollers, 10.5 mm.; distance of centers and wheels, 87.3 mm.; length of arms, 73.2 mm.; distance of centers of the rollers, 88.2 mm. In diminishing or augmenting the dimensions proportionate to the diameters, the same rules will answer for any other wheel of 30 teeth.

For wheels having more or less than 30 teeth, or where the anchor shall embrace more or less than nine teeth, see the table calculated and published by M. R  dier, in the *Revue Chronom  trique*, tome I., p. 139.

Recoil escapement of Brocot.—We have said that one of the merits of the dispositions invented and arranged by M. Brocot, is the isochronism of the oscillations, obtained by the aid of a slight recoil. The trials made by the inventor have gradually led to the great improvement of the different dispositions, and the difference of rate which at first was 17 seconds in 24 hours, have been reduced to 1, or, at most, to $1\frac{1}{2}$ seconds in the same space of time, which is certainly as little as can be demanded of a clock for everyday use; the roller escapement will therefore render excellent service. It will be understood, however, that the isochronism will largely depend from certain proportions in the length and weight of the pendulum, the force of the train, the length of the escapement arms—proportions which it will be impossible to fix by theory. Repeated trials are necessary for each particular case, to arrive at the desired degree of isochronism.

Desfontaine's anchor escapement, (Exposition of 1855.) Fig. 15.—This escapement, which is dead-beat, differs from that of Graham in

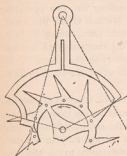


FIG. 15.

having the lifting take place on only one side of the escape wheel. The pallet on the opposite side serves simply for repose; the drop is just sufficient to prevent an encounter. The repotes occur at the ends of the teeth of the scape wheel, which are long and sharp, which eases moreover the pressure upon the planes of repose. The impulsion is produced by pins (or, better said, by half-pins) perpendicularly fixed in the limb of the wheel.

The advantages of this escapement are, a great simplicity of execution, and the facility which it offers to mark the time between two and two pendulum oscillations. It is particularly applicable to mantle clocks with half seconds. It should be preferred to the escapement called *   becridre*, contrived to fulfill the same purpose. It will be seen in the cut how the escapement should be constructed to be rigorously in conformity with its principles.

Amant pin escapement, Fig. 16.—The scape wheel is flat, and carries in place of teeth, pins perpendicular to its plane, on one side. Each one of the pallets is formed, 1. Of a curved part ce' , ce' , concentric to the anchor axle, upon which the pins form repose, thus permitting the pendulum the facility to move without either imparting or receiving any motion; 2. Of an inclined part es , et , being the place of impulsion.

This very remarkable escapement is the origin of all pin escapements in use, and which are considered as the most perfect, and has

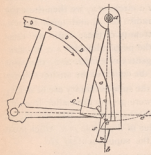


FIG. 16.

undergone but trifling alterations. The principal modification consists in the substitution of half instead of round pins of the first inventor (the cut represents half pins).

Lepaute pin escapement, Fig. 17.—This escapement differs from that of Amant in, 1. The pins are placed alternately on the two faces of

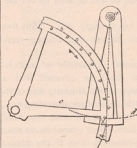


FIG. 17.

the scape wheel, by which arrangement the anchor arms may be made of the same length; 2. The pins are not fixed upon a same circle; those upon one side are outside of, those upon the other side are within, the circle drawn through the midst of the verge, in order to make the impulse levers equal; 3. The pins are reduced to one-half of their thickness, which otherwise also diminish the drop.

Considered from a theoretical point of view, this escapement answers all the conditions of desired regularity; indeed, "the repotes are perfectly even," said Lepaute, "and at equal distance from the center; the friction upon the arcs of repose is very trifling; the two arcs of repose are two concaves, and passed through with the same velocity, the same force, and in the same direction. The levers by which the wheel acts are equal, as well as the planes upon which it acts; the impulsion commences at the same distance from the center, and ceases at the same distance upon the two; it makes it with a same force and in the same direction."

The disadvantage of a pin escapement is that it requires more work and care in its execution. We will remark that the oil would be better retained at the pins, if care is taken to keep them a little conical. The repotes of the pallets should correspondingly be kept somewhat convex, so that the pins rest only by their middle, which thus would draw on the oil and prevent wear.

FREE ESCAPEMENTS.

Berthoud's escapement, Fig. 18.—The scape wheel c is represented as being at repose; the tooth d rests upon the end of a lever d , which itself is at repose upon a pin g , where it is held fixed by the weight of a small mass s . The piece ft , which here replaces the anchor, is mounted upon an axis t , to which is fixed a lever not given in the figure, and whose extremity is united to the verge of the pendulum in such a manner, as to render the motion of the two as if one piece. The fork ft can move freely to the right without coming into contact with the scape wheel. On its return, the lever $a b$ butts against the tip

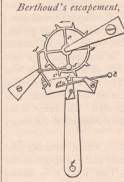


FIG. 18.

of the lever $d g$, and the excursion continues still free to the left. But when the oscillation returns to the right, the lever $a b$ acts upon the detent $d g$, and disengages the scape wheel. At this same instant, the notch i of the fork appears before the tooth c , which gives the impulse; and after the escapement, another tooth falls on repose upon the lever $d g$, having become free again, after its extremity g is disengaged from the hook a .

This escapement is planned with ingenuity and well arranged; but the multiplicity of its efforts hinders its exactness; it cannot be compared for regularity and surety of rate with a good dead-beat escapement.

Delent escapement of Th. Reid, Fig. 19.—The scape wheel $c v$ is provided both with pins, which serve to give the impulse, and teeth, which form the repotes. The anchor $b' a b$, movable upon an arbor a , ordinarily carries pallets $b' b$, shaped like those of a dead-beat escapement, which act solely with their inclined planes, upon which the pins give the impulse; the faces of repose, whose curvature has the

same center as the anchor, glide between the pins, without touching them, when the wheel is at repose. The detents, d, d' , are mounted upon independent arbors e, e' , which are parallel to the anchor arbor, and almost touch it. Their weight retains them naturally upon their fixed block g, g' , where their descent is regulated by the screws ff' . These detents carry at e, e' , behind the screws, pallets or sockets, which advance under the teeth and detain them, while the ends of the detents touch the blocks. The screws ee' , fixed to the detents,

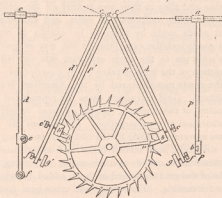


FIG. 19.

rest upon their points on the hind part of the pallets rr , thus that the anchor cannot move either to the right or left, without raising either one or the other detent. When the pendulum oscillates to the left, for instance, as is represented in the sketch, it draws with it the anchor and the detent d' , which it only abandons when, on the return motion to the right, the latter will be found retained by its block g' . During this vibration the wheel is at repose upon the socket b of the detent, and the pallets pass freely into the space between the pins. The pendulum continuing its motion to the right, the anchor pushes the end of the screw s , raises the detent d , and frees the wheel. The pin then falls upon the pallet b , and by the pressure upon the inclined plane, retrieves the loss of the pendulum; the pin having escaped, another tooth comes to repose upon the socket b , and thus it continues, the pins and the teeth in action always occupying opposite positions.

There will be seen to the right of the figure, at p , a rod of the anchor from the side; the pallet b , of jewel, is provided near its end with dovetail shaped notch. One of the detents is represented to the left, by d ; the swelling at the side of the screw e serves to adjust the socket of repose, not represented in the figure; the socket also is of jewel.

"The rate of a clock provided with this escapement has been compared from time to time," says Th. Reid, "with an excellent astronomical instrument, and during a period of eighty-three days, it has remained true to the second, without any apparent deviation meanwhile. Such a degree of exactness is without doubt accidental, and the unreasonable conclusion should not be drawn that this escapement, any more than any other, can be counted on such a rate."

The constructor remarks that this escapement is peculiarly adapted to demonstrations and experiments, because it may be changed either into a dead-beat or recoil at desire, without stopping the motion of the clock; to transform it into a simple dead-beat escapement, it suffices to raise the detents, or to remove them altogether. The pins will work thus by themselves alone. To make it a dead-beat, the detents must be charged with a little weight, and the screws ff' .

The same escapement, perfected, Fig. 20.—Th. Reid gives the following proportions; they fulfill the same details as the preceding

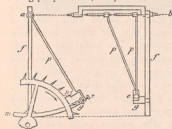


FIG. 20.

a, b , always independent of the detents, however, which also act inde-

pendent of each other. The anchor is simply provided with a spur, mg , in form of an arc, curved back at the two ends, to receive the scape wheel e , and thus serve for the purpose of unhooking.

We next find, however, a new arrangement, making a great difference in the performance of the escapement; when the pendulum motion to the left, for instance, has disengaged the left tooth, that of the right, b , falls upon the inclined plane, and itself repels this plane, by virtue of the force of the train, up to the point where it finds itself arrested by the little socket—the end of the pallet. The pendulum accomplishes its motion here, and returns to the right, always drawing along with it the anchor and detent from the left. From the time that the spur has touched the screw w , the wheel is disengaged, and it exerts its force upon the pallet on the left, which it arrests at once, it pushes back next, and then also falls upon repose. The pendulum completes its motion to the right, with the anchor and detent to the right, free, however, which accompanies its motion, thus that it is not arrested by a contact with the tooth.

It will thus be seen that there is nothing in common between the train and the pendulum; the scape wheel alternately changes the detents; which, each one in its turn, are drawn along by the pendulum in its to-and-fro motion, but the action of the coming is stronger than that of the going, from the effort of the tooth impulsion. The detent presses longer on the pendulum at its return, and it is this difference which produces all impulsion. It will be perceived that the amplitude of the oscillations is here regulated by the sole weight of the detents, and that the force of the train has no influence. Unlike ordinary escapements, an increase of motive power produces a reduction of the amplitude, because the impulsion does not change, and a greater loss of power will take place in the operation of the unhooking.

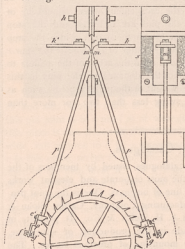


FIG. 21.

Cole escapement, Fig. 22.—The performance of this escapement is the same as that just described, and a further description is unnecessary. The proportions, also, appear to us less adapted for close rate; it possesses the single merit of greater simplicity.

Denison escapement, Fig. 23.—This escapement has many things in common with those already described, and only differs in 1. The scape wheel has only three pins and three teeth, and the train thus requires an additional wheel; 2. The tooth points are six times farther from the center than the pins; 3. The wheel axis is provided with a fly, similar to those of striking works, in order to deaden the encounters. By this arrangement, the unlocking requires six times less force than the other escapements, and it takes

place noiselessly.

Locking-spring escapement of Th. Reid, Fig. 21.—This escapement is

almost the same in its arrangements with the preceding ones. The pivot detents in this are replaced by spring detent $em, e'm'$; but their effect is absolutely the same. The pendulum itself carries the spurs gg' , which disengage the detents, thus that the anchor is suppressed. The verge is suspended by the two springs, ss , and each detent by a split spring m , as is represented in the side view.



FIG. 23.

According to the description given of it by the inventor, this escapement appears to perform like the free escapements; the weight of the detents solely propels the pendulum. The functions of the wheel are to alternately repel these detents, when an unlocking has taken place by the pendulum impulse; which acts directly upon the foot of the detent by the screws fixed in its rods, without the inter-mediation of a fork. Such an arrangement has been represented in the figure. We would remark, however, that the position of the pins is not in accord with the directions of the inventor, who recommends to put them, as well as the teeth, upon the radius of a hexagon.

In modifying the position of the pins upon their circle, this escapement may be made to operate like a dead-beat escapement. Thus let us suppose that the pin e is on the point of escaping, or on the contrary, be at the height of the impulsion plane, at the beginning of the lifting, the pendulum progressing in the direction indicated by the arrow, will drop the tooth s , and the lifting will take place upon the detent from this same side. When the pin has escaped, the tooth t will repose upon the spur r , and will remain in this position until, in its return movement, the balance shall drop it. The arcs of supplement are here described without any relation between the wheel and pendulum, which carries away only one of the detents.

Mr. Denison reports that he has not been able to observe any variation in the amplitude of the pendulum arc in cold temperatures, when the oil had become congealed to the consistency of tallow. By doubling the propelling weight, no variation neither in the vibration arc nor in the rate has been observed.

According to the inventor, the escapement wheel should be of steel, of 1.6 mm. in thickness; the pins are of brass, and the stop spurs of steel. The fly is 38 mm. long and 19 mm. wide; the stop spur s is at the same height with the center of the wheel; the spur r being a little higher. The distance from the arbor of the pallets to the center of the wheel is 36 times the distance of the pins to this center, generally 15 cm. The weight of the pallet must be such as not to cause the pendulum to swing less than two nor more than two and one-half degrees.

Elegant Catalogues.

WE have just received two catalogues, issued by members of the jewelry trade, that are the most elaborate and elegant works of the kind ever issued in any line of business. One is the joint production of the Gorham Manufacturing Company, Carter, Sloan & Co., Robbins & Appleton, and A. H. Smith & Co. It presents in graphic form the advances made in the production of silverware, jewelry, watchmaking, and the mounting of precious stones. The book contains 112 pages, 8x11 inches; it is bound in old English style, having a rich and elaborate design and inscription on the front cover, printed in subdued colors. The frontispiece represents a solid silver tea service, beautifully engraved, exposed on a table, with a profusion of rich tapestry for a background. There are fourteen colors blended in this illustration in such perfect harmony as to present the silver ware like a solid substance, with its decorations of gold and elaborate engraving. This picture represents the perfection of the printer's art, for never before have we seen an illustration where the colors were so rich, so artistically blended and produced such a harmonious and perfect result. The first part of the book is taken up by descriptions and illustrations of the goods manufactured by the Gorham Manufacturing Co., and includes examples of almost everything manufactured of sterling silver. The illustrations are printed on a black background with tinted shadings, by which means the numerous pieces are brought out in as close a resemblance to silverware as the printer's art is capable of making. There are tea sets, forks, spoons, butter knives, fish knives, berry spoons, soup ladles, and many other articles too numerous to mention, all accurately reproduced, showing their beauty of form and wealth of ornamentation, with a fidelity to detail that we have never seen equaled. Accompanying the illustrations is a full list of the great variety of

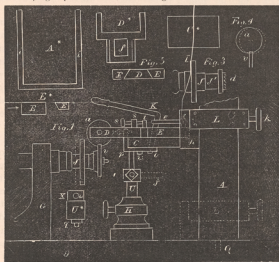
goods made by the Gorham Company. The second part of the book is occupied by Carter, Sloan & Co., manufacturers of gold jewelry, bracelets and chains. Here are presented *fac similes* of the various styles of goods manufactured by them; bracelets in profusion, embracing many new and novel designs, guard chains, face pins, sleeve buttons, studs, crosses, charms, chateaux, lockets, rings, and the thousand and one things that go to make up a complete assortment of fine goods. In their announcement, Carter, Sloan & Co. state that they refine and alloy in their own factory all the gold used by them, thereby securing uniformity of color, and enabling them to guarantee all goods made by them to be exactly as represented. Their list of goods includes everything in the way of gold jewelry, from a baby's bib pin to the most elaborate sets for ladies' wear. The third portion of the book is taken up by descriptions and illustrations of the goods manufactured by the American Watch Company of Waltham. Gold and silver cases are reproduced in imitation of the colors of those metals, showing a great variety in style, size, and elaboration of ornamentation. Illustrations are also given of the various movements made by the company, including the Bartlett, Ellery, Riverside, and several other well known and popular names. Attention is called to their mode of selling cases, by actual weight of the gold contained in them, added to which is the market price for making. The springs and other base metal necessary to a case, are not charged as gold. A *fac-simile* of the certificate of guaranty given by the company with each watch sold, accompanies the catalogue. Alfred H. Smith & Co., importers of diamonds, occupy the last portion of the book with a description of the special facilities they offer to diamond buyers to secure perfect gems. A large illustration—in black and white—represents some rich specimens of diamond mounting, necklaces, ear-drops, pins, etc., the originals of which would constitute a good-sized fortune for a modest man. Another illustration gives an interesting view of the famous Kimberly diamond mine, in South Africa, which is the largest and most productive diamond mine in the world. They also present an elaborate table—occupying sixteen pages—showing the values of diamonds in all fractions of a karat. As an illustration of the simplicity of the table, take a diamond that weighs 1-2, 1-16, 1-32, which is valued at \$115 per karat, the value of the fractional portion named would be \$66.48. This table of values runs from the 1-64 of a \$10 per k. diamond, to the minutest fraction of a \$500 per k. diamond. These computations, numbering 10,240, were made by a young man in the office of the firm, subsequently verified, and are guaranteed as absolutely correct. The tables cannot fail to be of immense value to all persons who buy or sell diamonds. Taken altogether, this combined catalogue is unique and elegant, presenting to the trade samples of full lines of goods sufficient to stock entire any retail dealer. It is the perfection of typography, and may well be preserved as an artistic brochure. The second catalogue to which we have referred is the "Illustrated Catalogue and Price-List of Meriden Britannia Co.'s Electro-Gold and Silver-Plate on Nickel Silver and White Plate." It is an immense volume, containing 324 pages, 12x18 inches. It is bound in red muslin, and richly ornamented in gold leaf and black. The design of the front cover is unique and artistic, making the large volume highly attractive. The frontispiece is a beautiful steel plate engraving of the company's works at Meriden, Conn. There are 2,124 illustrations in the catalogue, showing nearly everything capable of being made in plated ware. Some of the sets show a wealth or ornamentation that, for artistic excellence and rare beauty, has never been excelled. The useful and the ornamental both find example in the catalogue, but articles of practical value largely predominate. The illustrations are given under appropriate headings, and the volume has a cut index to each department. To enumerate the marginal index is to show the contents of this invaluable catalogue. There are tea sets and waiters, tilters, pitchers, casters, individual casters, peppers, salts, pickles, salad stands, dishes, wine stands, epergnes, fruit stands, ice cream and berry dishes, knife rests, nut bowls, dessert sets, sugars, creamers, baskets, butters,

spoon holders, syrup cups, prize cups, jewels, card stands, toilets, vases, candlesticks, bake dishes, turkeys, vegetable dishes, hotel ware, bar goods, biscuits, sardines, ink stands, cigar boxes, tobacco and match boxes, tea-pot stands, paper weights, communion ware, art work, spoons, forks, etc., knives, etc., solid silver, cased goods, call bells, star salts, silver polish. This list indicates the subjects illustrated, and as there are many illustrations of each subject, some idea can be obtained of the great variety of goods thus presented to the view. Some of the prize cups and vases are elaborate in design, representing mainly events of a sporting nature—fishing, hunting, yachting, rowing, horse racing, etc. But it is impossible for us to give more than a brief outline of the contents of this elaborate work; nothing like it has ever before been presented to the trade. Like the catalogue above mentioned, this is a marvel of the typographic art, and also of the wood engraver's. The cuts give a clear and comprehensive idea of the subject illustrated, and present the various modes of ornamentation with rare fidelity.

Advice to Watchmakers' Apprentices.

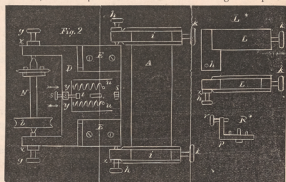
BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BED.

THE apparatus for cutting teeth in wheels is shown in the accompanying engravings, and can be made either of brass or cast iron. The cut shows an American lathe; but as in former cuts, it is easy to adapt it to any foot lathe. The principal parts are shown separate at the starred letters *A**, *B**, etc.; this is done to better explain the parts and facilitate the making of patterns; all these pieces are shown just one-fourth the actual size in the cut. But it is one-fourth the finished size, and in making the patterns, if you select cast iron, which is the best, a trifle must be added for finishing; say, the thickness of the pins *A** *C** *D**, are $\frac{1}{4}$ of an inch when finished; the pattern should be $\frac{3}{8}$; but such proportion does not apply to extreme-breadth sizes. That is to say, if *D** measures $\frac{3}{8}$ in the cut the finished size would be $\frac{2}{3}$ inches and the pattern should measure $\frac{2}{3}$. The piece *A** stands on the bed of the latter as shown at *A*, Fig. 1. The two upright pieces to *A*, and designated as *i i*, in the cut, are



carefully filed and fitted up to exactly $1 \times \frac{1}{4}$ of an inch, and 4 inches high. On each of these pieces (*i*), goes a slide *L*, Fig. 1, which is shown separate at *L**, and combined at Figs. 1 and 2. These slides are made of four pieces riveted together, and consist of a piece of cast iron 1 inch long, $\frac{1}{4}$ wide, and $\frac{1}{4}$ thick, when finished; and two pieces of heavy sheet iron $\frac{1}{8}$ of an inch thick; these are united as shown in the cut. The short iron pieces are $1\frac{1}{2}$ inches long, $\frac{1}{2}$ inch wide. The pieces through which the clamping screw *k*, goes, would be better of wrought iron, and is $\frac{1}{2} \times \frac{1}{4} \times \frac{1}{4}$ inch. The hole shown at *h* is intended for the screws *k*, Fig. 2, to work in. These screws (*k*) are cone pointed, and work into pits drilled and counter-

sunk in *C*, and should have lock nuts *x*, as shown in Fig. 2. The use of these slides (*L*) are to adapt and adjust the cutting apparatus to the different sizes of wheels, and also for bevel gear—for crown gear, the pin *C* and the parts it carries stand perpendicular. The piece *D** carries the cutting arbor *N*, Fig. 2; this piece is $\frac{1}{4}$ of an inch thick; the other sizes can be got from the cut. This piece (*D*) slides on *C*, between two pieces *E* *E*, Fig. 2; they are also shown in cross section at Fig. 5; the bevel sliding surfaces should be nicely fitted up to work easily, yet without any side shake. Grinding these parts together with emery or oilstone dust will facilitate matters; wash off the pieces clean with soap and water. The piece *D*, has an opening shown at *f*, which is as large as is consistent with strength; this opening has two spiral springs shown at *u u*, Fig. 2, which draws the piece *D* back. One end of these springs are attached to *D* at *y y*, by hooks formed by drilling through *D* opposite the arrows, and driving a taper wire pin into the holes—let the inner end be bent into a hook and the outer end filed off smooth. The other ends of the springs, *u u*, are attached to pins in the plate *C*. At *K*, Fig. 1, is shown an elbow lever; the bent part extends downward through the opening in



D, and also through a slot in *C*, where it works on a pin joint; this pin joint is in a pin (*p*) of wrought iron bent at right angles; this piece is also shown at *K**; it should be about $\frac{3}{8}$ inch thick, $\frac{1}{2}$ wide, and secured to *C* by a screw and two steady pins. The screw *r* in this piece, serves to stop the piece *D*, when it is forced forward by the bent lever *K*. At *s*, Figs. 1 and 2, is shown another stop screw; this screw is tapped through the stud *s*, which is fast to *D*, and strikes against a stud *t*; this stud (*t*) is fastened to *C*. The piece *D* should be so arranged that it will have a play back and forth, when the screws *r* and *s* are drawn back of about $\frac{1}{16}$ of an inch. To understand this matter, it will be seen that the tool rest holder *H*, is placed directly under the piece *C*; it will also be seen that the pieces *U* and *w*, which are in the rest holder, will stop the pin *C* at this point, which is the point where the cutter *a*, has cut to the right depth in the wheel on the arbor *f*. It is evident that *C* can sink no lower, and if the elbow lever *K* is still pressed down, the springs *u u* will yield, and *D* be carried forward, as *K* is connected to *D* by the piece *c* and the stud *s*. The piece *c* has pin joints with the lever *K* and stud *s*. The object of this last described arrangement is to make the cutter *a* cut a tooth in a thick wheel, which does not show the curve of the cutter. This will be better understood by inspection of the diagram at Fig. 4, in which *a* is the cutter and *v* the wheel to be cut; the cutter *a*, when it reaches the proper depth, would be in the position shown by the full circle, but as the lever *K* forces *D* forward, the cutter *a* can go no deeper, but makes a straight cut through *v*. The use of the screws *s r*, as will now be seen, is to adjust the transverse of *D*, by the lever *K*, to the thickness of the wheel to be cut. The pins which go into the rest holder can now be explained. The piece *U* has a square head and a tail or tongue, turned off, filed to fit the hole in *H* (the rest holder); through the square head is drilled a hole at right angles, as shown at *U**, which is a view looking downward; through the hole in *U*, goes another very similar shaped piece, except it has a screw and nut as shown at *g*. The hole in the head of *X* should be tapped, and the screw *w*,

extend upward through it. The hole in the head of U should not be tapped, but be held in place by the nut g . The object of having X turn is to let the screw w be set at any angle to stop C , when cutting level or crown gear; the dotted lines at f shows the position it would be in for cutting crown wheel teeth. Around w goes a loose spiral spring, which lifts the cutter out of the tooth just cut; two or three different lengths of spiral springs will answer, as the screw w is left at about the same length in all sizes of wheels; you get at near the size by raising or lowering U in the tool post, and only use w for close adjustment. Of course it is understood that the spiral spring rises a little above w . The ends of the cutting arbor N , runs in recesses in the point of the screws g & g ; these screws should have lock nuts to prevent their getting loose. We will suppose now, to make the description more perfectly understood, that we have a wheel on the arbor f , as shown at v , Fig. 1. The spacing or dividing apparatus described in my former article is applied; the piece A is fastened to the bed of the lathe by the screw Q , shown in dotted lines. The piece A should be put so that the cutter is nearly in the right position when the screw Q is set up. The screws g & g serve to change the cutter in a slight degree; so also do the screws s and r in regard to the traverse of the cutter. But if the piece A is put on right but very little change need be made. The sliding pieces L , should be set so that the screws h & h , Fig. 1, are the same height above the lathe bed as the top of the wheel to be cut; this prevents your wheel being conical. The screws r and s are set so that the piece D will carry the cutter a trifle more than the thickness of the wheel to be cut. A fiddle bow is now applied to the pulley b , and worked back and forth with the axis of the lathe, and the lever K pressed down, the spiral spring around w yields, and the cutter begins to cut; the screw w should be gradually lowered until the cutter is at the right depth; still press on K , and the springs u & u , yield and a straight cut is made and a perfect tooth formed. If you were cutting a pinion, say for a clock, the screws s and r would be drawn back so the cutter would cut straight for perhaps the full traverse of $\frac{1}{16}$ of an inch. As soon as the hand (the left one) is removed from K , the springs u & u carry D back to place, and the spiral spring around w lifts the cutter from the tooth just cut; the same hand as was used on K , shifts the spacing lever, then goes back to K , and repeats until your job is done. The right hand has no occasion for quitting the bow until the job is finished. The advantages possessed by this style of cutting engine for jobbing are several, and the facility by which the parts can be applied are not among the least. The arbor f , for holding the work, is best made of two parts; the part going into the lathe spindle, which has the collar to which the spacing or dividing wheels are attached, should be of steel, and bored out and tapped so as to admit of brass chucks for holding wheels to be cut, being secured into it. You will need quite a variety of these, but of the steel part you will need but one, as all the spacing wheels should have exactly the same sized holes. These spacing wheels need not be of large diameter; from $\frac{1}{2}$ to 2 inches in diameter are quite large enough. In doing work with this attachment, suppose it is a stem wind wheel such as is common in Swiss watches, and shown at Fig. 3, (this diagram is on a larger scale than the rest); the secondary brass chuck mentioned above is shown at f' , and the steel chuck at f . The pin of steel (very soft) for a blank, is attached to the brass chuck as shown at d . The most convenient way to fasten such a wheel for cutting, is to soft solder it, as it admits of no nut being screwed against it. Turn your brass sub-chuck f' , with a short pin; broach out your wheel blank until it goes easily on this pin and soft solder it fast. The blank should now be turned into the correct form for the teeth. Remove the chuck entire; attack the spacing wheel to L , and replace your chuck; apply the parts described in my last article for moving and holding the spacing wheel; put U in the tool post, fasten A with the screw q , select a cutter of the proper shape, adjust the parts as described above, cut your teeth, which will be but a very short job after the engine is adjusted. As soon as the teeth on the outside are cut, change the cutter and advance

A toward the wheel turn w , as shown in the dotted lines at f ; drop L to the position shown also in dotted lines. You can now cut the ratchet teeth in the end as shown at d . For cutting such wheels a small spacing is required. In cutting steel wheels the cutter must be kept oiled. In making the cuts for illustrating this article it was necessary to make some changes from the sizes mentioned in the text, as it was found that Figs. 1 and 2, if only $\frac{1}{16}$ the actual size, would be confused, and consequently, Figs. 1, 2 and 4 are $\frac{1}{16}$ size. The starred letters L , R and U , are also $\frac{1}{16}$ size. Our next article will give details of making spacing wheels and cutters.

"Venus of Melos."

A VERY careful article in the *Century* presents about all that is worth knowing in regard to the discovery of the "Venus of Melos"—but what is of greater interest discusses what the statue might be. This noble statue, which has done more during the last fifty years than anything else to purify human taste and to emancipate us from those stiff and erudite ideas of Lessing, Overbeck, Muller, and Jahn on Greek art, has always presented itself in the guise of an enigma. Given, unfortunately, a false name—an alias at the start—when her stately magnificence shown forth from the niche where she had been hidden, some stupid story was rife that this figure held an apple in her hand. We have had a great deal about Venuses in our time, past and present, with or without apples or mirrors. Mr. J. W. Stillman, the author of this article, comprehends the matter exactly when he defines what should be the characteristics of any study directed toward research of this kind. "The case is one in which archaeological knowledge is of very little value, unless it be aided by thorough artistic study and a knowledge of the requirements of art proper. The archaeologist, like other scientists, must have positive evidence to work on, and the testimony of pure taste, the intuitions of an artistic education, are of no use to him except as confirmatory." For instance, Mr. Abbott finds a decorated axe or a sculptured pipe in Massachusetts. Archaeology, a dry-as-dust performance at best, alone may determine the fact of its age, with the positive data as to its authenticity, but the decorative portion requires the artistic knowledge. From its characteristics, crude or tentative as may be the few rude lines traced or the ornamentation, the critic decides whether it be from the east or west coast of America. Archaeology, then, as Mr. Stillman expresses it, when it has to do with antique work, has a limited importance, but the sense of art, which must be intuitive, and then should be thoroughly cultivated, does everything in setting a question of this character at rest. The "Venus of Melos" (why call it Milo any more?) was never a Venus, but was undoubtedly a Niké. There is a grandiose, sublime mien about this statue which was foreign to the loose mother of cupid. Why not at once then abandon the Venus and call this, the sublime piece of human handiwork, something else—a Niké if you please; anything else than a Venus? Poor and miserable as may be the plaster casts of this statue, or even elaborate as are the best of bronze copies, they one and all fail to impress one with even the tithe of the grandeur of the original. Perhaps no happier passage was ever written by Thackeray than the one in which, in a few glowing lines, he expands over this Niké, the greatest of all statues.

It was a Boston girl who asked: "Why is it that two souls, united in the impetuous mystery of their nativity, float by each other on the ocean currents of existence without being instinctively drawn together, blended and beautified in the assimilated alchemy of eternal love?" It is because there is so much 18-karat jewelry made out of 9-karat gold, and 10-karat chain with a 14-karat swivel, sold to an innocent and unoffending public, and that the manufacturers of such goods are permitted to grow rich in their iniquitous work. That's why it is.

Goldsmith's Notes.

We intend hereafter to give in this department practical recipes culled from English, German, French, Spanish, Italian and other foreign exchanges. Since the metric system is in vogue on the Continent, we subjoin closely calculated tables for the same:

MEASURES OF CAPACITY.		
No. Liters.	Dry Measure.	Wine Measure.
Name.	Weight of what quantity of water at maximum density.	Avoirdupois weight.
Gram..... equals	1 cubic centimeter..... equals	15.439 grs.
Decigram.....	1 cubic centimeter.....	1.5439 grs.
Centigram.....	10 cubic millimeters.....	0.15439 gr.
Milligram.....	1 cubic millimeter.....	0.01543 gr.

STANDARD WEIGHTS OF UNITED STATES COINS.		
Double Eagle, \$20 gold.....	316	Half Dollar, silver..... 129.9
Eagle, 10.....	308	Quarter Dollar, silver..... 62.45
Half Eagle, 5.....	154	Twenty Cents, silver..... 31.225
Quarter Eagle, \$2.50.....	65.5	Dime..... 25.85
Three Dollars, silver.....	75.4	Three Cents, copper-plated..... 13.925
One Dollar, silver.....	35.8	Three Cents..... 39
Trade Dollar, silver.....	420	One Cent, bronze..... 45
One Dollar.....	412.5	U. S. gold and silver coins are 910 fine.

—To clean gilt metal surfaces, dissolve 30 grains borax in 1 kilogram water, and gently rub the article with it; rinse with clean water, and dry with a soft linen rag.

—Larger springs, which are exposed to breaking, are best annealed by rubbing them with tallow and letting it burn off over a gentle fire. Springs thus exposed do not break so easily, and are very elastic.

—An excellent German silver is prepared by melting in a crucible 55 parts copper, 23 nickel, 17 zinc, 3 iron and 2 tin. This composition is in every respect equal to silver in appearance, fully as hard, and not vitreous.

POWDER FOR SILVERING.—To 16 parts melted tin add an equal quantity of mercury, rub it well together, and with it mix 125 parts prepared harshhorn. Any metal rubbed with this will take the appearance of silver.

ALLOY FOR FROM 8 TO 18 KARAT GOLD.—6 karat: 6 parts fine gold, 6 fine silver, 12 copper; 8 karat: 6 fine gold, 5 1/2 fine silver, 10 1/2 copper; 10 karat: 10 fine gold, 4 1/2 fine silver, 9 1/2 copper; 12 karat: 12 fine gold, 4 fine silver, 8 copper; 14 karat: 14 fine gold, 3 1/2 fine silver, 6 1/2 copper; 16 karat: 16 fine gold, 2 1/2 fine silver, 5 1/2 copper; 18 karat: 18 fine gold, 2 fine silver, 4 copper.

—Articles which do not require much handling, may be quickly gilt without battery as follows: 1 part of chloride of gold and 4 parts cyanide of potash are dissolved in boiling distilled water, and the gilding fluid is ready; the articles are hung into this hot solution tied by a fine copper wire to a strip of zinc, scratched clean, left in it for a few minutes, and they will be handsomely gilt.

MAT BRUSHING.—The fine wire matting-brush should run at a speed of about 2,500 revolutions a minute, while brushing rain water or sour beer mixed with water, or a juice derived from boiling liquorice wood in water, should drop on the place where the brush strikes the work, and occasionally a piece of sand paper held against the brush. When the wire points are too straight, let them strike over a piece of wire, taking care not to hook the points too much, which would prevent matting. Keep the brush in good order constantly, and when the wires become tangled or form knots, they should be separated or knotted brushes cut out. When the work is matted, brush it in soap-water with a soft hair-brush, then rinse in warm water, containing a little spirits of ammonia and caustic potash, lay it for awhile in pure alcohol, and finally dry off in sawdust.

ACID-COLORING SOLID GOLD.—Saltpetre 2 parts; salt, 1 part; muriatic acid, 1 part. Put saltpetre and salt into the coloring pot, and heat it without water, then add hot water sufficient to produce a thick paste, let it boil, add the muriatic acid and stir it up well. As soon as the brown vapor arises, plunge the work quickly, being careful to submerge it completely, (since the vapor will affect the work if exposed to it). Let the work boil over a quick and lively fire, (and preserve it during the whole process) for about three minutes, stirring it about constantly, taking care not to let any part of it come to the surface of the liquid. Then rinse the work in a light pickle, and thereupon plunge it into hot water. Quick and careful handling in dipping in and taking out the work is important. This done, the acid color should be thinned by adding hot water, or one-half old color, which is preferable. Submerge the work again, let it boil two minutes, and should some pieces require it, such should boil one minute longer. Now boil the work in a pickle, two thumbfuls of muriatic acid to one gallon of water, then again in a pickle containing only a few drops of acid, then dry off the work carefully in hot sawdust. (Work not properly dried will draw spots.)

RECIPE FOR SAME FOR 14 KARAT GOLD.—Saltpetre, 4 parts; salt, 2 parts; muriatic acid, 3 parts. Put the first two in pot and

heat strongly; add a little water; let boil up, and when it becomes a thin paste, add the muriatic acid, stir up and put in the work, taking care to submerge the work in the color completely; let it boil two minutes, add as much water as you did before muriatic acid, make it boil quickly again for two minutes, take out the work, boil in hot water, then in another pot of hot water, to which a few drops of muriatic acid have been added, then rinse in hot water, and dry as above.

—Freshly deposited chloride of silver, well washed with hot water, is mixed in equal proportions table salt and cream of tartar, until it becomes a batter, and, if necessary, with the addition of water. The article to be silvered is first cleansed with a good stiff brush and a solution of soda and soap, and thoroughly rinsed to remove any dirt, and again rinsed with hot water. It is to be recommended to submit it to a dry cleaning of pulverized and washed chalk, pumice stone powder or quartz powder. When well rinsed with cold water, make a ball of loose cotton wrapped in soft muslin, and with this coat the wet article with a thin layer of salt; then rub some of the silvering batter on to it, until the whole article under treatment is well silver-coated. When sufficient, quickly rub with a little ball some cream of tartar upon the silvering, and wash. The silver deposit will be found handsome, clean, and as white as snow.

REMARKS ON HARDENING STEEL.—Every watchmaker knows that heated steel dipped into water, becomes hard. Care, however, must be taken that the steel does not burn, but only be brought to a red heat. Steel burned while being hardened is useless in that state, as it becomes full of cracks and thus fractures very easily. It may be restored again by red heating it several times and dipping in hot water—if it was not burned too much. For hardening pinions or other larger steel objects, do as follows, to prevent the ruinous warping: Make a box of thin sheet iron, with a well fitting cover upon it, and white heat it before using. Then fill it to one half with burned ivory; place the piece of steel into it, fill it full with said ivory, put the lid upon it, and wrap the box with binding wire. Then put the box into a charcoal fire, until white hot, withdraw and immerse it in cold water, letting it remain in it till cool; the color of the steel will be gray, it has no crust, and is not warped. Anneal steel thus hardened, not quite as much as is done with other—instead of dark blue, dark yellow.

SILVERING WITHOUT BATTERY.—Silvering by contact is not as durable as battery, although the color is the same. The solution is prepared as follows: Take 1 part chloride of silver, 6 parts prussiate of potash, 4 parts purified potash, 2 parts salt, 4 parts caustic ammonia, 4 1/2 parts rain water. First prepare the chloride of silver, then dissolve the prussiate of potash in water, and add it, then the potash, salt and ammonia, and boil the whole for half an hour in a porcelain vessel; filter, and the fluid is ready for silvering. The utmost cleanliness also is a primary condition by this method. Heat the fluid up to boiling, then introduce the article together with a piece of clean zinc. Take it out after a few minutes and brush it with cream of tartar, and put it back again into the solution, in which leave it for three or four minutes. Then brush again, and continue thus until it is sufficiently silvered. This silvering will bear polishing with the steel, and takes a nice black lustre. Articles thus silvered cannot be distinguished from silver articles. It is very good to protect galvanic casts against dimming. But when silvering no more must be taken of the fluid than will be used.

TO MAKE CAUCUS.—Take sulphate of iron in quantity to suit, break it into small pieces, and put into a clean iron heating-pan, which place upon a gentle coal fire. The sulphate will soon become fluid, and part with its water of crystallization, but become dry little by little. It thus loses its green transparent color, but will turn into a whitish opaque mass. Now increase the heat under the pan, and constantly stir the mass with a rod, taking care not to let anything adhere to the pan. It will gradually assume a darker color, until it becomes red. Stir it well and see if it be uniformly red and heated, then remove the pan from the fire and let it cool. When cold, rub the mass fine in an earthen or porcelain vessel, pour boiling water upon it, and let it stand for a day; then decant and add more boiling water, stir well and let it stand for another day, when decant and replace it by fresh. Stir again, and let it settle for a few minutes, until the coarse iron-containing powder has settled. Now pour off until the fluid down to the dregs into another vessel, let it stand in this for several days until the fine powder has settled and the water has become clear, which then pour off and dry the powder in the air; but not by the fire, powder dried by the fire scratches. The red powder thus obtained is ready for use. Preserve in a dark place.

REDUCTION OF SILVER-GROUNDING SEDIMENT.—There are two methods to obtain the silver from the sediments—by melting and by

dissolving. For melting, the sediments must be washed several times to remove small pieces of charcoal as much as possible. Then dry and red heat it in an iron heating-pan, and add to each pound of sediment 2 pounds of litharge, to which may be added 1 pound ordinary potash and $\frac{1}{4}$ pound salt. Put this, when well mixed, into a crucible placed into a draught furnace. During melting, stir with a red-hot iron rod, and when melted, leave the crucible for a half hour in the fire. When breaking the crucible a metallic mass will be found at the bottom, having rather the appearance of lead than of silver. Litharge is an oxide of lead, and when reduced by melting, settles to the bottom taking along all other metals. To free the silver, this lump must be parted in the cupel.

When reducing by dissolving, the sediments must also be first well washed and red-heated. Then put it into an earthen vessel, and pour concentrated sulphuric acid over it; this will soon begin to boil; permit this ebullition for half hour, then pour into a vessel and replace it by fresh, when this has boiled for another half hour, add it to the first and replace by fresh, until all effervescence has ceased, which is a sign that no more silver remains in the sediment. Next deposit the silver by the common process, which will be fine silver.

To see which method was most profitable, I treated one pound of sediment by melting, the other by dissolving. From the first I received 2 ounces; from the latter 3 ounces of silver. The cost of the latter treatment is not nearly half as great as that of the first. Also nitric acid may be used, which, however, is costlier.

THE SAME FOR GOLD SEDIMENTS.—This also may be reduced by the same two processes, melting and dissolving. For melting, the sediment must also be washed several times; it is next dried, and to one part of the sediment add 2 parts litharge, $\frac{1}{2}$ part borax, 3 parts potash, and $\frac{1}{2}$ part salt. This will soon begin to melt well in a strong fire. When fluid, it must be well stirred with an iron rod. A lead mass will be found at the bottom upon cooling. Bring this upon the cupel and drive off; the residue will be silver and gold, which part.

Sediment for dissolving must also be well washed; red-heat it, wash again, and dry. Then pour strong nitro-muriatic acid, (3 parts muriatic, 2 parts nitric acid, one part water) and let it stand for one hour, replace by fresh for another hour. These two applications will be sufficient to dissolve all the gold contained in the mass. Next dilute the acid and precipitate the gold. By this treatment any silver contained in the sediments is lost, the immediate acid forms chloride of silver, which mixes with the sediment and cannot be saved, being indissoluble in this acid and water. I prefer melting for the reduction of the gold to dissolving; I have found that by the latter way I always lost, at least I never had as much as when I melted it. The loss of the silver is sometimes quite significant.

PREPARING GOLD SOLDERS.—When preparing gold solders proceed as follows: When the gold and silver are melted add the copper with a little borax, and when the metals are well melted, stir it well with a warmed glass rod, to produce an intimate commixture, and pour into the previously oiled and warmed form. When preparing any solder whatever, salt must most diligently be used, and the production of this solder to first melt silver, gold and copper under cover, and only when the crucible has become somewhat cooled down, to add the zinc, while constantly stirring the mass; even under these circumstances the zinc cannot be prevented from burning, therefore take a little more. Another receipt for fine gold solder is made by taking 16 grains fine gold and 2 grains fine silver, melt them in a new crucible in a draught furnace, stir the mass well and throw in a little calcined borax, of the size of two peas, as soon as it flows clear. Then pour into the form, cut into thin sheets, and dip it. By so small a quantity as the specified, a crucible is not necessary; a charcoal may simply be hollowed out, and the metal can be melted by the blowpipe. Should the article to be soldered be very thin, to each part gold, one-quarter fine silver may be added.

CONTACT GILDING.—This method consists in submerging the article in a gold solution in connection with a piece of zinc. The solution is prepared in a different manner from a galvanic solution. It must be heated up to boiling, the zinc and the article are put into it, but must not touch each other, as it might produce white spots. The same handsome light yellow color may be had, but it is by no

means as durable as galvanic gilding. The greatest cleanliness must be observed by this method. It offers greater advantages than any other, owing to the speed. Articles which do not require much handling are quickly gilt in this manner. The solution is as follows: Take 1 part dry chloride of gold, dissolve it in 5 parts water; next pour over 5 parts prussiate of potash, as much boiling water as is necessary to dissolve it; this solution add to the dissolved chloride of gold; also add 4 parts purified potash, 3 parts salt, and 40 parts water, and boil the mixture in a porcelain vessel for a quarter of an hour; replace that which evaporated, by water; next filter through clean printing paper, and a clear yellow fluid will be the result, ready for gilding. As already said, the greatest cleanliness must be observed. If the gilding fluid is heated up to boiling, the gilding will take place quicker, as when simply warming it. The article to be gilt is placed in the same time into it with the zinc, and must remain only four, or at most only five minutes, at one time. After a few minutes take it out and brush it with cream of tartar, rinse it off in water, and put it back again together with the zinc, let it be exposed for several more minutes, then take out and brush again. Do this until the gilding is as heavy as desired. The zinc must be washed several times in water acidified with sulphuric acid. It is of advantage to put a piece of copper between the zinc and the article; a contact, consequently white spots, are thus prevented, caused by the formation of chloride of zinc. The color may be varied by the addition of cyanide of copper or silver.

—Auguste Darier, sworn assayer, in his work on the treatment of gold and silver, says: The success of low-grade gold is often connected with much trouble to the workman; much depends on the quality of the material employed, the heat given to the gold, but most of all, on the care and attention bestowed on the casting.

To make gold below the legal standard, 18 karat gold should be used, which, if possible, has already been worked. The workman should have a well-drawing furnace and small crucibles. Such gold rarely ever succeeds in large quantities.

When the alloy has been prepared, the 18 karat gold is first melted, under borax, and when running the alloy is added, and a little blast of fire is given it. At the end of a few minutes, when the mass is well melted, it is stirred with a fine clay rod, a pinch of sal ammoniac is added, and it is run quickly. This process answers well for gold of 17, 16 and 15 karats. For low-grade gold, 12 karats, after having added the sal ammoniac, it is immediately covered with common tartar of potash, and run before it has time to melt.

Above all, it is highly necessary that golds which contains much alloy remain but a short time in the fire. The more rapid the cast, the more chances of success. The heat must be less than that at which 18 karat is run. If the matter do not take grain for 2 or 3 meltings, it is useless to persist, the workman will not succeed. In such case, note the weight of the gold, and, after having melted anew, add a few grains of saltpeter, and later on some borax. It is rare that the grain does not form by this operation. Replace the water and run into bars.

Due care must be taken when working golds of a low grade. Since they are generally very close-grained, they must be hammered but little, and often reheated to a red shade. Let them cool without tempering, these golds of about 15, 16, 17 karats, especially if they are of red color. Golds of 12, 13, 14 karats may be tempered in sulphuric acid thinned with water, not water alone. For less grades, it is better to let them cool.

It often happens that when low-grade golds, otherwise of good quality, are tempered too suddenly, they will snap into pieces or become scaly under the hammer. Below is a list of certain alloys of different colors, such as occur often in the practice of the jeweler.

18 karats, red: Fine gold, 750 parts; red copper, 250.
18 karats, rose: Fine gold, 750 parts; fine silver, 50; red copper, 200.

Green: Fine gold, 750, fine silver, 250.
Gray: Fine gold, 750, iron filings, 250. These must be stirred into melted borax, and quickly added to the melted gold. Give much heat.

17 karats, red: Fine gold, 655; fine silver, 200; copper, 145.
15 $\frac{1}{4}$ karats, 18 karat color: Fine gold, 635; fine silver, 200; copper, 165.

14 karats, common: Fine gold, 560; fine silver, 200; copper, 240.
13 karats, red: Fine gold, 540; fine silver, 150; copper, 310.

12 karats, white: Fine gold, 540; fine silver, 200; copper, 260.
9 $\frac{1}{2}$ karats, reddish color: Fine gold, 392; silver, 150; copper, 458.

To preserve in low-grade golds the color of 18 karats, the alloy to be added must be in equal parts.

Business Notes.

Rogers & Bros.' new spoon, "The Saratoga," is one of the most artistic productions of this celebrated firm.

J. W. Hutchinson, a well-known jeweler of Portsmouth, N. H., has occupied his present store for sixty-eight years. He is probably one of the oldest watchmakers in the country.

John A. Riley & Co.'s patented bracelets continue to hold a high place in popular favor. They are presenting many new and attractive designs that must compel the attention of buyers.

Eberhard Faber, manufacturer of gold pens, pencil cases, pencils, etc., offers an attractive line of goods, among which may be included a new line of 16-k. gold pens that are becoming universally popular.

The celluloid watch cases still retain their popularity in the trade. Many new and beautiful designs are constantly being brought out by their enterprising manufacturers, and may be procured from the jobbing trade.

Dubbing & Co. occupy the entire upper floor of their large building on Fourth and Walnut streets, Cincinnati, as a factory, where they manufacture jewelry, watch cases, and solid silver ware, employing about 150 hands.

Rest, Fenner, Smith & Co. have in stock for the holiday season a large assortment of gold and silver headed walking canes, and are prepared to fill orders promptly. They have introduced many novelties in silver mountings.

Taylor & Bro. offer a rich line of French clocks, in all the latest patterns and newest effects. These goods have been selected with great care by the senior member of the firm, with a view to the requirements of the market.

Hale & Mulford present a very artistic novelty in bracelets, called "the Hellene," a representation of which is seen in the announcement elsewhere in THE CIRCULAR. It is exceedingly beautiful and destined to become a favorite with the trade.

The W. L. Gilbert Clock Co. are manufacturing a great variety of walnut, veneered and other clocks in various styles of ornamentation. These productions of the firm enjoy a high reputation in the trade, and are deservedly popular with the public.

Fred. Morck, of Warren, Pa., has been selling off some of his old stock at auction, to make room for new goods. Mr. Rutherford, the well known jewelry auctioneer, had charge of the sale, and charmed the good people of Warren with his eloquence.

The New Haven Clock Company is importing a new line of French clocks, in all the artistic styles of ornamentation. Some of the designs are novel and exceedingly beautiful, being in harmony with the modern style of house architecture and decoration.

Leopold Weil & Co., manufacturing jewelers, present an attractive line of novelties in gold plate goods. Mr. Weil is a gentleman who is well and favorably known on the road, and his enterprise and fair business dealings have won for him well merited success.

Noterman & Jonas, of Cincinnati, present in this number of THE CIRCULAR, an advertisement calling attention to the Garfield bangle ring, which is a very pretty little article for the holiday trade. They are the originators of this attractive article of adornment.

Peter Hartmann, manufacturer of silver filigree jewelry, has achieved a high reputation for the excellence of his wares. He presents many beautiful and artistic novelties in combs, necklaces, bracelets, half sets, etc., particularly appropriate for bridal and holiday presents.

The old and well known house of G. & S. Owen & Co., makers of fine Roman jewelry, box and glass pins, black onyx and pearl goods, etc., fully sustain the reputation accorded them by the trade, by reason of the standard quality of their wares, and we are pleased to say that it is as deserving as it is great.

Henry Troenmer, the well known scale manufacturer of Philadelphia, has just completed, for the U. S. Assay Office in St. Louis, several pairs of very fine scales for weighing gold. They are magnificent specimens of mechanical skill, and the adjustment is perfection itself. There are four balances in all, the largest of which is used for weighing bullion, and when loaded with 10,000 ounces (about 685 pounds avoirdupois), shows the sensibility of the 1-100 of an ounce. The smallest balance is used for the assaying. The beam is made of pure aluminum, and the bearings are full jeweled. The sensibility of this balance is truly wonderful. When loaded with ten grains in each pan, the addition of 1-10,000 of a grain is instantly indicated. A human hair one inch in length can be weighed with the utmost accuracy.

Dueber Watch Case Mfg. Co., of Newport, Ky., have just completed and are now moving into their additional factory, which is 194 feet long, 65 feet front, and three stories and basement, fitted up with the most approved appliances for making watch cases. Mr. Dueber intends building a duplicate of this factory in the spring.

Messrs. Bawo & Dotter, of this city, whose announcement appears elsewhere, have a very extensive collection of *biague* figures, *faience* ware, etc., and are importers of a very attractive line of French jewelry. They also offer the largest line of ornamental china, porcelain and decorative Dresden, Royal Worcester and Parian marble goods to be found in this city.

Simons Bros. & Co., manufacturing jewelers, of Philadelphia, have issued a supplement to their annual catalogue, illustrating the great variety of gold and silver thimbles manufactured by them. The senior member of the firm is one of the veterans of the trade, and the standard goods made by the house are as familiar to all purchasers of jewelry as household words.

Chas. L. Abry, successor to the old established house of the late J. A. Abry, offers an unusually complete stock of Swiss watches in all grades, from the low priced, nickel case "Excelsior," to the best watch of the most celebrated maker. Mr. Abry is the exclusive agent in the United States for the celebrated Vacheron & Constantin watches, so well and favorably known in the market.

The Meriden Silver Plate Co. have opened a New York store at No. 30 East Fourteenth street, which will be under the management of Mr. Frank E. Knight, who is well and favorably known upon the road as a traveling salesman for them for many years. The store is very handsomely fitted up and presents a very artistic appearance. Mr. E. T. Hopkins will take Mr. Knight's place upon the road.

J. F. Stratton & Co., wholesale dealers in musical instruments, music boxes, opera glasses and Parisian fancy goods generally, offer one of the most complete stocks of these goods to be found in the city. Messrs. Stratton & Co. are the sole proprietors of the Russian gut violin strings, so favorably known throughout the world. Parties desiring such goods would do well to communicate with this firm.

Holmes, Booth & Hayden, manufacturers of electro-silver plated spoons, forks, solid handle table knives, etc., direct the attention of the trade to their new styles of spoons recently introduced by them. These designs are of the highest order of artistic excellence. They are graceful in outline, rich in ornamentation, and are among the richest goods offered. A glance at their advertisement cannot fail to interest buyers.

Howard & Scherrieble, of Providence, R. I., have, in consequence of increasing business, largely increased their manufacturing facilities. They hope by this means to keep up with their orders for the American lever buttons, that are flowing in upon them. Attention is directed to their advertisement in this issue of THE CIRCULAR, which is one of the latest productions of the fertile imagination of the irrepressible Howard.

L. & A. Mathey's success in demagnetizing watches, is vouched for by many of the best workmen in the country. We have yet to learn of a single instance in which their method of treating magnetized watches has failed. Every intelligent workman knows how difficult it is to restore a magnetized watch, and its user worthlessness when left in that condition, and will doubtless appreciate Messrs. L. & A. Mathey's efforts in this direction.

One of the most attractive features for the show window of a jewelry store is the automatic clock pictures, representing various pastoral scenes and landscapes, with animated domestic animals, etc., introduced by L. & M. Kahn, who have the exclusive agency for this class of goods. An engraving representing one of these scenes may be found in our advertising columns, and we can conceive of nothing more effective in attracting public attention than one of these automatic clock pictures.

It has been well understood in the trade that some two years since the Howard Watch Company suffered severely by the failure of certain parties, with whom they had extensive business connections. Since then the company has been manufacturing goods continuously, but on a more limited scale than formerly. It gives us pleasure to announce that arrangements have been made by which the company is to be reorganized with an abundance of capital, under the name of the E. Howard Watch and Clock Company. The new organization will go into effect December 1. The new blood thus infused into the company will enable it to liquidate every dollar of its indebtedness, to relieve its extensive plant from all incumbrance, and supply the means for a more vigorous prosecution of its business than ever before. The goods manufactured by this company have always been popular with the trade, and the complaint that the supply has been limited will be entirely overcome from this time forward.

What is Going On in the Trade.

Fancy jewelry has multiplied itself *ad infinitum* this winter.

Snails of moss agate are favorite ornaments for hats or lace pins.

There are more diamonds worn now than ever before in this country.

Stevenson's jewelry store at Rockford, Mich., was broken into and robbed of \$1,500 worth of goods on the evening of the 3d ult.

Messrs. Haack & Diolot, manufacturing jewelers of this city, have dissolved partnership. Mr. Diolot continues the business.

One hundred and thirty-nine failures were recorded during the month of October, the jewelry trade contributing two to this number.

Some sneak thieves recently entered the jewelry store of F. H. Lockwood, No. 927 Sixth Avenue, and stole a number of watches valued at \$1,200.

Several expert diamond cutters and polishers from Amsterdam have established themselves in this city, and are doing a very satisfactory business.

The watchmaker in New Orleans who took laudanum instead of shooting himself, exhibited a spirit of non-self-mutilation worthy of general emulation.

Mr. Alfred H. Smith, of Alfred H. Smith & Co., Mr. J. Saunders, of Saunders & Ives, and Mr. H. Randel, of Randel, Baremore & Billings, returned from Europe on the 10th ult.

Thos. M. Lynch, a watchmaker doing business at Oxford, N. C., was brutally murdered on the evening of the 22d ult., while returning to his home. His alleged murderers have been arrested.

Two masked men recently entered the jewelry store of F. A. Shook, Kansas City, and while one of them held the boy who was in charge, the other stole \$1,500 worth of jewelry, and both escaped.

Mr. C. H. W. Galt, of Washington, was united in love's golden links (8-k.), to Miss Mida W. Massey, in St. Paul's Church, Rock Creek, Dec. 1st. The happy pair are now enjoying the sweets of the honeymoon.

The wife of a Missouri jewelry placer some nitro-glycerine in her daughter's corset on the evening her fellow was coming. The daughter loaned it to the hired girl, and they had to scrape the old man off the ceiling to get enough to hold an inquest over.

Mr. J. A. Fleming, for several years with the Elgin National Watch Co., has resumed the management of Messrs. H. Muhl's Sons' New York establishment. Mr. Fleming is an old traveler, highly esteemed by a large circle of friends, who will be glad to learn of his advancement.

Some time since the mayor of Cincinnati undertook to enforce the collection of a tax upon commercial travelers, but after much ventilation of the subject, it was shown that his action was in violation of the state laws, and he was compelled to withdraw from the contest he had provoked. The commercial men were much rejoiced over the outcome of the controversy.

An impetuous Russian prince in Berlin, finding himself without money, and wishing to go to St. Petersburg, planned what he thought a very clever swindle. He had some \$3,000 worth of jewelry sent to his house by a credulous jeweler, and persuaded the guileless hotel porter to lend him \$1,000 to pay for it. He then sold part of the jewelry, and attempted to decamp with the rest of his ill-gotten gains, but before reaching the railroad station, the luckless adventurer was arrested by the authorities. His visit to Russia is indefinitely postponed.

Mr. A. K. Sloan, of the firm of Carter, Sloan & Co., was united in marriage to Miss Minnie Cromwell, of Skaneateles, N. Y., on the 9th ult. The ceremony took place in the Presbyterian church, and was attended by the relatives and friends of the contracting parties. The happy pair started for the west immediately after the ceremony, and were congratulated at every stopping place by hosts of friends, who wished them God speed in their journey together through life. Mr. Sloan and his bride returned to New York after three weeks' absence, and have taken up their residence in Brooklyn.

Daniel I. Tenney, an old jeweler, died on the 25th ult., at the Metropolitan Hotel, in this city, at the advanced age of 81. Old New Yorkers will probably identify the name as that of the leading retail jeweler of this city more than thirty years ago, and will recall his store at the corner of Broadway and Murray street as the Tiffany's of 1850—and many years preceding. In 1856 he deceased retired from business, having amassed an ample fortune. Mr. Tenney was born in Newburyport, Mass., and distinguished himself by munificent gifts to his native city. The deceased was greatly beloved by a large circle of friends, and his memory will be revered by all who knew him.

In the case of Isaac and Aldrich, the pawnbroker and detective who were sentenced to state prison some months ago for alleged complicity in the Morrow jewelry robbery in Chicago, have been released by a recent decision of the Supreme Court of Illinois. The case was carried up on error, and the Court overrules the judgment of the lower Court, on the ground, as we are informed, that both the pawnbroker and the detective were acting in good faith to secure the restoration of the property, and were not responsible for any shortage in the amount of goods returned. We shall receive the full text of the decision shortly, and will reserve comment upon the case until our next issue.

He was a nice and very new young man, and his employer took kindly to him on the first day in the store, asking him to help in "checking off and calling back" some watch movements and cases. All went well until the youth, in finishing up a string of numbers, called out: "Fifty-five, -seven, forty-to—Ken!" A great solemn hush fell over the rest of the clerks as the old man called the blushing lad up to the desk and desired an explanation, and the misguided youth put his foot in deeper by stammering out that it was only "force of habit" made him say it. The old gentleman eyed him calmly for a moment, and then, laying down seventy-five cents for his day's wages, said: "Boy, 'rake the pot,' and go and renounce your sins."

A most successful and audacious robbery of diamonds occurred recently in London. It is the practice of the dealers there to send diamonds in registered letters, and numerous transactions of this kind occur daily. Recently some thieves watched the Hatton Garden Post-Office in the evening, and when it was finally left in charge of female clerks alone, they forced their way inside, turned out the lights, and seized a number of registered letters. They succeeded in getting away with their plunder, which included several thousand pounds worth of diamonds. The robbery created great excitement by reason of its audacity and ease with which it was accomplished. Jewelers have taken the alarm, and are adopting additional precautions to protect their goods both in their places of business and in transit.

A guileless youth has recently been swindling a number of jewelry firms in this city by means of the very old dodge of obtaining goods on memorandum through forged orders. He had letter heads printed bearing names of different firms, and on these would write an order to some one in the trade, to please send certain specified articles on approval. To this request he would forge the name of the firm, and, in a number of instances, succeeded in obtaining the goods named. Although the fraud has been discovered, the perpetrator is still at large, but has probably left the city. The trade cannot be too careful in their transactions by memorandum, for it opens the door to frauds of various kinds. The messenger bearing orders for goods should be well known, or they should be sent by the messenger of the house delivering them.

Almost every day the papers contain accounts of the robbery of a jewelry store in some country place. It is well known that gangs of thieves from New York and other large cities, are on the road, traveling from place to place, and earning an honest dollar occasionally by burglary and robbery. Agents of these gangs can be seen in Maiden Lane and John street daily, watching the express wagons to see where goods are being sent. This information is furnished to their accomplices in different parts of the country. Merchants cannot be too careful in guarding their stocks, or exercise too close a surveillance upon strangers who visit their establishments, and exhibit a great desire to examine goods. There are so many thieves around that it is safe to regard strangers with suspicion, or at least, to exercise extreme watchfulness over them.

A well-dressed man entered the jewelry store of H. N. White, in Broad street, near Morris and Essex ave., Newark, on the evening of the 16th ult., and asked the clerk in attendance to show him some watches. Several were laid on the case for his inspection, and, after pretending to examine them, he suddenly started for the door with two gold watches in his hand. The clerk endeavored to head off the thief and was promptly knocked down. The thief ran across Broad street to Division street, when a hackman, who was formerly on the Newark Police force, hearing the cries of the clerk and seeing the man running, tried to intercept him. The thief halted, drew a pistol and fired at the hackman, the ball grazing his neck and embedding itself in his necktie, where it was afterward found. Patrolman J. H. Clark, attracted by the report of the pistol, appeared on the scene, and gave chase to the thief, who turned and fired at the policeman. The latter returned the shot, but without effect. The thief managed to escape into one of the side streets near the river. The police have a fairly accurate description of him.

THE Jewelers' Circular and Horological Review.

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THE JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

*The recognised organ of the Trade, and the official representative of the
Jewelers' League.*

A Monthly Journal devoted to the interests of Watchmakers, Jewelers, Silversmiths, Electro-plate Manufacturers, and those engaged in the kindred branches of art industry.

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NOTICE TO SUBSCRIBERS.

THE TWELFTH VOLUME OF THE CIRCULAR closes with the present number. Those of our readers whose term of subscription has expired, and who have been notified by our usual circular, will confer a favor by responding as promptly as possible, as all subscriptions terminating with this number will be discontinued if not renewed.

Our Closing Volume.

THE present issue of THE CIRCULAR closes its twelfth volume, and with it will be found an index to its contents. In making announcement of our next volume, we do not intend to indulge in any cheap promises as to what we propose to do; the motto of THE CIRCULAR from its first issue has been "Progress." That it has lived up to its motto a glance through its back volumes will bear witness. We point to our record with pride and satisfaction, and refer to it as a promise of what may be expected of us in the future. We have used our best endeavors to make THE CIRCULAR the representative art journal of the jewelry trade, and the pecuniary reward vouchsafed us by the trade is an indication that our efforts have not only been successful, but appreciated, by those most competent to determine what the trade requires. But, apart from our own labors, THE CIRCULAR has been the medium selected by numerous experts in the business, to lay before the trade technical and instructive articles, to the value of which we can certify. As we look over the numbers of the past year, we are truly surprised at the vast amount of valuable information our columns have contained. Every number has alone been worth the price of a year's subscription. Arrangements already concluded and in progress, warrant us in stating that the volume of THE CIRCULAR for 1882 will surpass in interest all its predecessors. With the closing of the year, we congratulate the trade upon the prosperity that attended it during 1881, and wish it continued success in the future.

The Business of the Past Year.

THE year 1881, just closed, was one of the most prosperous the jewelry trade has ever known. That is to say, the volume of goods sold was exceptionally large, and the profits fair, so that, on the whole, while there have been times when the margin for profits was larger, the transactions of the past year were probably as satisfactory as at any time in previous years. Dealing exclusively in articles of luxury, the jewelry trade may be considered as a barometer that indicates the state of commerce generally throughout the country. It is the first to be affected by times of financial stringency, from which it recovers more slowly than other industries, but when the jewelry trade thrives, it is a sure indication that all other industries are in a prosperous condition. Such was the fact during the year just ended. The holiday trade a year ago extended well into January, and was remarkably good; then followed preparation for the spring trade so closely upon the heels of holiday orders, that merchants scarcely had time to balance their accounts and get their stocks in readiness. With scarcely an intermission, trade has been good from last year's holidays to the present time. When the country watched breathlessly around the death bed of President Garfield, and stood tearfully beside his grave, there was a temporary lull in business of all kinds, and orders for a short time came in but slowly. But the national crisis safely passed, commerce resumed its sway, and all kinds of business immediately became active again. The pages of THE CIRCULAR have been a faithful reflex of the condition of the trade at all times and seasons, giving from month to month a typographic photograph of all that was passing, of interest in its various branches.

One of the most encouraging features of the trade during the past year was the unprecedented demand for high-class goods. Never before were so many goods of superior excellence disposed of in a single year, and never before have our manufacturers put forth such persistent and successful efforts to lead the market in this respect. The retail trade has evidently awakened to a realization of the fact that their best interests lie in successfully educating their patrons up to a higher art standard, and teaching them to appreciate the marked difference between goods of really intrinsic value and artistic excellence, and the cheap tawdry stuff that relies upon a depraved taste for its purchase. By keeping constantly on hand a stock of the best goods, and discouraging the purchase of the "cheap and nasty," it is possible for retail dealers to foster and encourage a love for art work in jewelry, and, at the same time to improve their business condition and standing. So long as they consent to handle goods degraded in quality and tawdry in design, so long will they be regarded as common traders and hucksters instead of dealers in reliable jewelry. The manufacturers exceeded all previous efforts in producing goods exquisite in design and workmanship, some of which could not be surpassed by the best designers and workmen of Europe. In the matter of designs the trade has taken a long step in advance, producing original work that has commanded marked attention. The demand for precious stones was also very noticeable during the year. Our importers find it impossible to keep pace with the requirements of the trade, and could readily have disposed of a much larger quantity of diamonds and other precious stones, if they could have

obtained them abroad. The United States are now recognized as the largest consumers of fine gems of all purchasers in foreign markets, and our people are also noted for their critical taste. More diamonds are now worn than ever before, but to command a ready sale and a good price, they must be of the best quality. Great improvements have also been made in the settings of gems, and there is no end to the elegant and artistic designs wrought with them.

There was also a good demand during the year for ten and twelve karat goods. There is always a market for some goods of the cheaper varieties, and those houses that have preserved the quality of their products and kept pace with the novelties introduced, have found their profit in so doing. But there is so large a product of spurious goods, having but a symptom of gold in their composition, that public confidence in adulterated gold is being destroyed. The manufacturers of the very cheap goods rather overdid the business by overstocking retailers and loading them down with stocks which the public will not readily buy. There must naturally come a reaction, and the manufacturers who have been so anxious to push out their cheap material will find the demand slackening off considerably for some months to come. It is unfortunate for those manufacturers of legitimate cheap jewelry—which has its place and for which there is a demand—that they are brought in competition with what is, in common parlance designated "snide jewelry," professing to be what it is not, and sold only by misrepresentation and fraud. When six-karat goods are palmed off as fourteen karats fine, the transaction becomes a common swindle, yet it is just such misrepresentation that the legitimate dealers in cheap goods have to compete with. Notwithstanding this drawback, there are certain houses dealing in these cheaper grades of goods, that preserve their standard, and are making the same quality of goods to-day, when the margin of profit is greatly narrowed down, that they did before the war, when the bogus stuff was less known, or at least, was not brought into immediate competition with goods of known quality and excellence.

The holiday trade this winter set in early, has been very active, and promises well. Weeks ago some manufacturers notified their customers that they could not duplicate their orders in certain lines of goods, having already sold out their stock and accumulated orders to the full capacity of their factories. Stocks have been well culled over, and the factories will be kept running to their fullest capacity to replenish and prepare for the spring trade. Among other things accomplished during the year was a reform of some of the abuses that existed in the business. While the jobbers have been busy filling orders, they have had little time for interfering with the retail trade, and those few who were in the habit of sending out price lists and catalogues to outsiders, have pretty much abandoned the practice, thus leaving the retailers to cultivate their own fields, each after his own method. Taken all in all, the year 1881 was marked as one of unusual prosperity in the jewelry trade.

There are no indications at present of any abatement of this prosperity; the demand for goods is still active and promises to continue. We see no reason why it should not; no political disturbances threaten us, the greatest activity prevails in all manufacturing and commercial industries, and there is no dangerous inflation of the finances of the country. Speculation prevails, of course, to a great extent in the stock markets, but it lacks that wild recklessness that is the precursor of financial distress. On the whole, the outlook for the coming year is promising, and we congratulate the trade upon its prospects for another year of good business and fair profits.

A Jewelers' Board of Trade.

THE frequency with which failures occur in the jewelry trade, and the scandalous character of some of them, leads us to suggest that a Board of Trade should be organized that should have control, among other things, of all settlements with insolvent debtors. At present no regular system is pursued in making such settlements, and the consequence is that unscrupulous men take advantage of the fact,

and, after obtaining credit extensively, say to their creditors, "take what we offer in settlement of your accounts, or get nothing." The result of this, is that creditors are inclined to take anything offered rather than go to the trouble and expense of exposing the fraud. It has become a common thing for insolvents to send a lawyer here for the purpose of compromising their affairs. As the lawyer's fee is generally contingent upon the amount of salvage he recovers from the wreck, it is to his advantage to beat down the creditors all he possibly can. It is customary to appoint a committee of creditors to make terms with each insolvent, but such committees are, of necessity, composed of men engaged in active business, who cannot afford to spend the necessary time to negotiate a settlement to the best advantage. As a consequence, it has become notorious that the jewelry trade is the most liberal of all in extending credits, the least inquisitive regarding the antecedents of purchasers, and the most lenient in compromising with its debtors. The amount lost to the trade every year by swindling failures aggregates many thousands of dollars, and every dishonest debtor who, on payment of 20 or 30 cents on the dollar, gets a clean bill of health with which to commence business again, forms a standing invitation to other unscrupulous fellows to go and do likewise. But the actual loss in dollars by these cheap compromises is the least of the evils that follow in their train. The effect upon honest dealers of throwing into the market these stocks of goods for which the owners have paid but twenty cents on the dollar, is to demoralize the trade. A man who is honestly striving to make a living legitimately as a retail jeweler, and to pay dollar for dollar his indebtedness, cannot compete with a man whose stock has cost him little or nothing. How, for instance, can Clement Helleshush, or Clement Oskamp, or Duhme & Co., of Cincinnati, be expected to compete with such men as Stineau, whose goods have cost him less than forty per cent. of what theirs cost them? If the trade continues this practice of encouraging insolvents by giving them goods at fifty or sixty per cent. less than they give to their best customers, there will be no other course open to legitimate dealers but to follow the example of these highly favored insolvents. As at present conducted, these cheap compromises with insolvent debtors constitute the most demoralizing feature of the business. We have written much upon the subject, but, in the absence of any definite plan for curing the evil, it not only continues to grow, but is expanding into alarming proportions.

A Board of Trade, properly constituted and managed, that would take charge of every insolvent case that comes up, would, we believe, be an effective remedy for a disease that threatens to become epidemic. Such organizations exist in other trades, and where they exist we seldom hear of compromises being made with debtors. In such boards there are committees appointed to take charge of all cases of delinquency, able lawyers are permanently retained to assist the committees, and take charge of the legal phases of any cases that may be presented. The officers are paid sufficient salaries to compensate them for any loss of time involved in transacting the business of the association. By means of these boards, the failures in those trades are reduced to a minimum. So it would be in the jewelry trade, with an efficient board. When would-be insolvents know that capable business men, especially employed for the purpose, are to look into their affairs in case they do not pay their debts, instead of courting insolvency and planning failures, they will be exceedingly cautious in their business, and seek to avoid the exposure that they know must follow their bankruptcy. We venture the assertion that seventy-five per cent. of the failures that have occurred in the jewelry trade in the past three years, have had a flavor of fraud about them, and that the insolvents, instead of compromising their indebtedness for a pitiful sum, and getting a certificate of character from their creditors, and renewed credit with which to begin their fraudulent careers anew, would now be in state prison for swindling if they had received the treatment they deserved. And this is just what is needed to purify the trade and to rid it of the horde of unscrupulous adventurers that hang upon its skirts. A few criminal prosecutions would serve as an admirable

deterrent to persons contemplating failure and anticipating cheap and easy settlements. The names of a score of scoundrels, each of whom has made a competence by repeated failures, will readily suggest themselves to our readers. We should be glad to call them by name, but as the trade has condoned their offences, and is still giving credit to many of them, to speak of them as they deserve and call names at the same time, would involve us in suits for libel. But we are sick of the namby-pamby manner in which the trade treats this class of men. One day a victim of a chronic compromiser comes to us and denounces the man in the most vigorous terms; swears he has been deliberately swindled by him, and vows that he will follow him till he lands him in state prison. No words are emphatic enough to denounce the man who has swindled him and others in the trade. By the time we get the true statement of the case ready for the press, we ascertain that our irate friend has signed off his claim for twenty-five or thirty cents on the dollar, and that the trade has concluded to set the rascal up in business again. Only a short time ago one of these fellows who had failed, and who had persuaded the committee to recommend a cheap compromise, called on one of his creditors, and urged him to sign off his claim, as recommended, as soon as possible, for he was eager to go into business again. When asked if he had any capital with which to start afresh, he said a friend was going to lend him \$5,000, and with that cash in hand he could buy all the goods he wanted from the very men who had just settled with him at thirty cents. When it was intimated that the \$5,000 would be acceptable in settlement of old scores, he indignantly repudiated the suggestion, and disclaimed all responsibility for "old scores"—those were all paid—thirty cents on the dollar—and he had receipts in full from everyone but the person he was addressing. In the end he obtained his receipt, and now his credit is good again in the trade. How long it will be before he fails again we will not pretend to predict, but that it is a mere question of time, we are confident.

For the past few years the trade has virtually been offering premiums for insolvency. It is time this ceased, and we suggest as a remedy the organization of a Board of Trade that shall have charge of all cases of this nature. It will be useful in a great variety of ways to the trade, but in this particular matter it can be made invaluable, serving as a terror to evil doers as well as to those contemplating evil. It is not our purpose to suggest the details of such an organization, for, if the idea is accepted by the intelligent men in the trade, the plan of organization will naturally suggest itself. But it does seem as if some united and vigorous action is necessary to prevent the further spread of the very serious evil we have mentioned. We do not favor throwing the slightest impediment in the way of men who are embarrassed in business from legitimate causes, but we do want to see those unprincipled men who have everything to gain and nothing, not even character, to lose by failing, driven out of the trade, and subjected to such punishment as the law provides for misrepresentation, conspiracy, and swindling.

Detectives and Receivers of Stolen Goods.

WE alluded in December issue to a decision of the Supreme Court of Illinois, reversing a decision in the lower court in accordance with which a pawnbroker named Isaacs, and a private detective named Aldrich, were sentenced to state prison for complicity in a jewelry robbery in Chicago some months ago. As the case is an interesting one, a review of the facts will not be uninteresting. J. H. Morrow, traveler for Eaton & Faas and Ernest Thoma, of New York, was stopping at the Clifton House, Chicago. Having paid his bill, he ordered his trunk to be placed on the baggage wagon to be taken to the depot. The porter brought it to the sidewalk and placed it with other baggage near the wagon, ready for loading. Four thieves, named Mike Bauer, Nick Bauer, Herman Schroeder and Matthew Asch, picked up Morrow's trunk and made off with it. It contained jewelry to the amount of \$7,000 to \$8,000. The city detectives were soon placed on the case, but had little hope of finding the property

or thieves. After a few days, Mike Bauer offered to sell the goods to Isaacs for \$700, but he refused to buy them. He mentioned to Aldrich, who was a private bank detective, that he could recover the goods, and Aldrich, with a view to beating the city detectives, undertook to negotiate with Morrow. He first asked \$1,400 to secure the goods, but finally came down to \$700, which amount Morrow gave him. Aldrich gave \$600 to a man named Levi, who acted as a go-between, and Levi gave Isaacs \$450. Isaacs went to Bauer to get the goods, and, according to Bauer's testimony, only gave him \$300, promising him another \$100 the next day. Bauer then brought the goods to Isaacs, Isaacs gave them to Levi, and Levi turned them over to Aldrich, who, in ten minutes' time, placed them in the hands of Morrow, claiming that he had saved him \$100 in the transaction. Meantime Pinkerton's detectives had been working on the case, and arrested Isaacs and Levi for receiving stolen goods. Their trial lasted several days, at the end of which they were found guilty and sentenced to state prison. They appealed to the Supreme Court, and the decision referred to reverses the judgment of the lower court, remanding the case for a new trial. Chief Justice Craig, who rendered the decision, simply reviews the testimony adduced on the trial, and from that comes to the conclusion that Isaacs and Aldrich, instead of being receivers of stolen goods, were working in the interests of the owners of them to secure their recovery.

This may be good law, but if so, it leaves the trade in a quandary, whether it is not quite as well to be plundered by an enemy as by a friend. Aldrich first demanded \$1,400 to effect the negotiation with the thieves, but finally took \$700. This amount, however, dwindled down to \$300 by the time it reached the thieves, so that those persons who were working so industriously to reclaim the goods, made more out of the transaction than the original thieves. Then there was a shortage of \$1,300 worth of goods; but the thieves allege that they turned over to the go-betweens all that they found in Morrow's trunk. Where the missing property went to, the Chief Justice does not explain, but thinks it more probable that the thieves abstracted it than that the go-betweens appropriated it. It is a very much muddled case in all its features, and the decision of the Supreme Court does not seem to dispel the fog, while it certainly does relieve two persons from the sentence imposed in accordance with the finding of a jury of twelve disinterested persons. Accepting the theory laid down by the Court, any person has a right to constitute himself a private detective, familiarize himself with the methods and plans of thieves, and then use such knowledge with impunity, to deplete the pockets of the victims of robberies. If this is to be the rule, such victims had, in future, better deal direct with the thieves, and so save fifty or sixty per cent. of the cost of recovering stolen goods.

For a Better Bankrupt Law.

A MEETING was held in the Fifth Avenue Hotel on November 29th, of the "Committee on Bankruptcy Legislation" of the New York Board of Trade and Transportation, with delegates from various other organizations, to take steps to urge upon Congress the enactment of a uniform national bankrupt law. The meeting was called to order by A. B. Miller. Gardiner R. Colby, of the Merchants' Club, was elected chairman, and Mr. Patrick Farrelly, Manager of the American News Association, secretary. M. S. Wise, Walter H. Lewis, and Franklin Edson were appointed a Committee on Resolutions, and reported the following:

That, in the judgment of this Convention, the best interests of all classes of the business community imperatively demand the enactment of a uniform national bankrupt law, of such a character as to discourage fraud in mercantile transactions, to afford ready and efficient relief to honest debtors, to place all creditors, wherever located, upon an equal footing, to establish uniformity of administration throughout the country, and to secure the prompt and equitable distribution of the assets of insolvent estates, without preferences, at the least possible expense. That such a law should include a judicious system of composition, whereby settlements may be effected in proper cases, upon such terms as may be satisfactory to a sufficient majority

of creditors, without the delay and expense incidental to full bankruptcy proceedings, and that we do respectfully urge upon Congress the necessity for immediate action thereon.

Another resolution said that a bill based on a plan similar to the Lowell bill, would form a proper basis for the best practical construction of a suitable law, and a third expressed the conviction:

That any system which compels the settlement of bankrupt or insolvent estates in Courts of Equity or Chancery, according to their established procedure, would involve undue delay, confusion and expense, and would utterly fail to provide either uniform, equitable, or satisfactory, or permanent in its operations.

The resolutions were adopted. An Executive Committee will be formed to see that the views of the Convention are properly represented to Congress. In the course of conversation it was remarked that a man was going about getting signers to a petition, to which he claimed to have already obtained 200,000 names, against the proposed bill.

SOME English gentlemen have recently come to this country for the purpose of introducing a new style of house decorations that have become very popular in England and France. These consist of a new material called Lincrusta-Walton, which takes the place of wall paper. It resembles somewhat the costly leather hangings for walls that are occasionally found in the resorts of the wealthy, but are inexpensive when compared with leather. The material can be printed upon, and thus the most elegant designs produced in relief, both plain and in colors. Panels, imitation of bronzes, statues, figures of men and animals, birds, flowers, etc., are brought out in the most artistic manner, forming decorations for interiors that we have never seen equalled. For decorating stores and offices, this new material will, undoubtedly, speedily become popular, and we commend it to the trade for future use. Examples of this new material may be seen at the offices of the company, in the bank building corner of Nassau and Cedar streets.

THE fifth annual banquet of the Chicago Jewelers' Association was given at Leland's Hotel in that city on the evening of December 29. Representatives of the trade from all portions of the west were present, as well as a number of representatives of prominent eastern houses. Quite a number of Chicago's leading citizens were also among the invited guests. The banquet was an elegant affair in every respect, wit and wisdom characterizing the responses to the various toasts, and the best of good feeling prevailing throughout the entertainment. We regret that this affair occurred so late in the month as to preclude the possibility of giving a full report of it in this issue of THE CIRCULAR; in our next we shall devote considerable space to putting on record the many good things said on that occasion.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the exclusive official paper of the Jewelers' League and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League*, Box 4001, P. O., New York, or the office of THE CIRCULAR.

A member in Alabama writes to us:—"I think the illustration of the badge, in the last CIRCULAR, for the League, is a very appropriate one; it is something novel and is worthy of the craft." * I thank you sincerely for the kindness you have done for me in assisting me to join that noble order, the Jewelers' League, and I assure you that whenever I can be of any service to you, please do not fail to let me know, and I will show you what a Southerner's friendship is." That noble order is an apt term, and the nobility and steadiness of purpose of the members is well illustrated by the fact that not one member has been dropped from the roll during the year for non-payment of assessments. What nobler deed could be done than the payment, without murmur, of nearly \$2,500, to the absolutely destitute widow of the late deceased member, Andrew P. McGowan? This young man, if we are correctly informed, was earnestly entreated to join the League, and the entreaties were accompanied by the advancing of his entrance fees by his employers, Wheeler, Parsons & Hayes, through whose foresight and instrumen-

tal, his widow and four children will be at least temporarily relieved from dependence upon the support of friends.

The complete list of those who have donated to the League, for its benevolent work, their respective interests in the unused balance of the Chicago Fire Fund, is as follows: Colby & Johnson; Cox & Sedgwick; Hayward & Briggs; Miller Bros.; Wheeler, Parsons & Co.; (now Wheeler, Parsons & Hayes); Palmer & Capron; D. Bruhl, (now D. & M. Bruhl); Hodenpyl, Tunison & Shiebler, (now Hodenpyl, Tunison & Co.); Brainerd, Goddard & Steele, (now Brainerd & Steele); S. M. Lewis, (now S. M. Lewis & Co.); J. W. Pooler & Co.; (Conroversier, Wilcox & Co.); Henry Ginnel; Estate of Paul A. Bros; J. D. Brez; Vulcanite Jewelry Co.; Brown, Cook & Co., and Maass, Groeschel & Co., (now Cook, Groeschel & Co.); L. Strasburger & Co.; Th. Bloch & Bros., (now Bloch Bros.); J. W. Johnson; J. M. Morrow; L. & M. Kahn; Brooklyn Watch Case Factory; Lincoln, Tift & Co.; Joseph Fraas; T. B. Byrner & Co.; Julius Levin; F. F. Brailhard; H. E. Droy; J. A. Abry, (now C. L. Abry); Fellows & Co.; Henle Bros.; F. Kroeber; Cooper, Fellows & Co.; A. Wallach & Co.; Geo. O. Street & Son; Hessels & Ludeke; Freund, Goldsmith & Co.; Geo. W. Pratt & Co.; H. F. Barrows, (now H. F. Barrows & Co.); Estates of L. Durr & Bro.; Smith & Hedges, (now Wm. S. Hedges & Co., and Alfred H. Smith & Co.); D. H. Wickham, E. & D. H. Sittes, (now E. Sittes, and D. H. Sittes & Son); J. B. Matthews & Co.; Samuel W. Chamberlain; Giles, Wales & Co.; William S. Hicks, J. A. Riley & Co.; H. A. & G. M. Church, and J. W. Richardson & Co., fifty-one in all.

A commendable interest has been shown during the past month by Samuel A. Baldwin, in presenting the merits of the League to the favorable consideration of the subscribers to the said fund, and he has been instrumental in obtaining the gift of their interest therein from several who were only waiting to be personally invited by some interested member. Exclusive of those who, although having promised, have not yet completed the necessary papers, there yet remains about forty-five of the subscribers who have not signified their intention to donate their interests, of whom doubtless many are ready to do so, upon proper presentation of the matter to them by the members; this number includes several, the successors or survivors of whom the President has not learned the addresses, viz: Fraas & Soehlmann, G. R. Hill, Jacot & Gerard, Geo. A. Jones & Co., T. B. Lawrence, B. Seymour's Sons (stationery), and Chas. E. Todd. Any member knowing the addresses of any of the foregoing, may send them to the League, together with any other information in regard to them.

The Annual Meeting of the full membership of the League will be held on the third Tuesday in January. Due notice will be sent to each member, and a full and interesting meeting is anticipated. The Executive Committee has received formal notice that amendments to the Constitution will be offered, limiting the eligibility of members to between the ages of 21 and 40, instead of 21 to 45, as at present; also to strike out the section which limits the membership to 2,500.

At the regular meeting of the Executive Committee, on December 22, 1881, 68 applications were considered, of which four were rejected, nine were referred for investigation, and the following named (55) were accepted:

New York City, Allen C. Warner, Morris Kollender, Marks J. Lasar, Wm. H. Sandifer, Isaac Fry, Brooklyn, N. Y., George S. Webb, Harlan S. Noyes, Richard J. Timpon; Alfred Cooley, Mount Vernon, N. Y.; Jesse H. Andrews, Mount Vernon, N. Y.; Warren Banks, Vankers, N. Y.; North Attleboro, Mass., Thomas R. Bride, Henry E. Capron, Arthur E. Coddling, Edwin A. Coddling, James A. Coddling, Josiah E. Draper, Carl J. Hobzner; Henry J. Derby, Boston, Mass.; Chas. H. G. Minchen, Taunton, Mass.; Kansom J. Morse, Christ. Bernard, Chicago, Ill.; J. H. Pearson, Elgin, Ill.; Arthur Nethercot, Austin, Ill.; Anson H. Nash, Elizabeth, Ill.; Edmund W. Hissom, Woodstock, Ill.; Philadelphia, Pa., Wm. A. Wiedersheim, Chas. S. Hirst, L. J. Pequinot, N. S. Baily; Albert R. Weber, Pittsburg, Pa.; Henry Pyewell, Jacob Pyewell, Chester, Pa.; S. L. Ansbacher, Wilkesbarre, Pa.; George E. Twambley, Saco, Maine; Stephen Russell, Jr., Providence, R. I.; Clayton H. Case, Hartford, Conn.; John Hagan, Providence, R. I.; F. C. Hendrickson, L. Leleog, Newark, N. J.; Chas. McElroy, Rudolph Wenzelried, Cleveland, O.; John H. Campbell, Marshall, Mich.; Orrin Hall, Wauwaca, Wis.; James Gilowsky, Milwaukee, Wis.; N. N. Crane, Mt. Pleasant, Iowa; J. S. Andrews, L. B. Boyle, St. Joseph, Mo.; J. L. Schweizer, Selma, Ala.; L. H. Schmidt, Louisville, Ky.; Wm. J. Miller, Wheeling, W. Va.; August Baumann, New Orleans, La.; Walter S. Dickerman, Sherman, Texas; James H. Higgins, San Francisco, Cal.; Charles H. Wiltberger, Washington, D. C.

Views of Correspondents.

This department of *The Circular* is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

PERFORATED ADDRESSES.

To the Editor of the *Jewelers' Circular*:

My attention has been called to an article in your issue of November, headed, "Bogus Lists of Jewelers," which many of our friends in the jewelry trade think is a reflection upon us, as we are the only publishers of Ready Printed Perforated Addresses. I feel that had you taken the trouble to more fully investigate the matter, you would have refrained from using the words you have, and ask as a matter of simple justice to ourselves, that you give this letter the same prominence and publicity as the former article. The Business Address Company, as this heading denotes, is incorporated under the laws of the state, to facilitate the mailing of circular matter. With this end in view, we publish lists of different trades in convenient shape, and a great saving in time and money to those wishing to send out circular matter. Before publishing a list of jewelers, we sent our circular to the trade announcing our intention, and without making any rash promises, or any claim to do the miraculous, simply stated what our authorities would be in compiling the list, viz., the Agency books, and the different directories of the United States. These authorities are the best known, and we have simply endeavored to do for our patrons just what they would do for themselves, if they possessed the same facilities. In regard to inaccuracies in the list: Upon every piece of stationery that leaves this office, the notice is printed that we will refund the money for cost of addresses and postage, on any matter returned through any fault of ours. Do you not think that if our lists contained the many errors and inaccuracies you speak of, that we would be overrun with applicants for money for postage, etc., and soon be compelled to close our business, as a very large amount of matter is forwarded under a three-cent stamp? In conclusion, we do not claim to be infallible, but neither can anyone, upon reflection, see where we could, from a pecuniary point of view, print names we have no authority for, or as you are pleased to style it, "Bogus Lists." Very truly yours, Business Address Co.

Geo. Godfrey, Jr., President.

[Our complaint regarding these lists is simply that they include the names of persons who are not jewelers, thus furnishing to unscrupulous jobbers the means of sending catalogues and price lists to persons to whom they should not be accessible, to the injury of the legitimate retail trade. Our attention was called to this matter by several correspondents, who sent us samples of these lists wherein they noted the inaccuracies alluded to. We have no desire to injure the business of the Business Address Company, but we reiterate what we previously said, that an inaccurate list of names of persons purporting to be jewelers, opens the door to many evil practices, to the injury of legitimate dealers.—Editor *THE CIRCULAR*.]

BOGUS ROMAN-GOLD GOODS.

To the Editor of the *Jewelers' Circular*:

I have been grossly deceived recently in the purchase of what purported to be rolled-plate Roman-gold goods. There has been quite a lively appreciation of this style of jewelry, and, of course, there is a certain class of purchasers that cannot afford to buy the genuine article, but are willing to pay for good substantial goods that will wear well. Rolled-plate goods, when well made, satisfy this demand, and, when the plate is of a good quality of gold, and standard thickness, it usually gives good satisfaction. I recently ordered some goods in Roman gold, and received the assurance that they were rolled plate of excellent quality, and that I was charged enough to have paid for such. They were attractive, and I readily sold many of them. Within a week, however, some of my customers brought back the articles they had purchased, and complained that they turned black immediately they began to wear them. On examination, it turned out that instead of being rolled-plate goods, they were simply German silver electro-plated, the deposit of gold on them being scarcely perceptible. I had to take the goods back and refund the money, but I could get no redress from the manufacturers, for I had no warranty with them when I bought them. This is one of the most barefaced swindles of modern times, and should be denounced as such. The trade cannot afford to prostitute itself to the extent of handling such rubbish, and I hope my brother retail dealers will refuse to keep such stuff in their stocks. If dry-goods men, and finishing-goods dealers want to handle such cheap and fraudulent goods, I say let them do it, and it will be all the better for jewelers

who keep only the better class of goods. The public will soon grow tired of being swindled by bogus gold goods. But if they turn to the legitimate dealers and find the same kind of trash, they will lose all confidence in our goods. I say, send the cheap and fraudulent goods to Coventry, and do not let it be found in the stocks of legitimate dealers. This latest swindle in Roman-gold goods is the most outrageous fraud I have encountered, and I warn the trade to beware of it.

RETAIL DEALER.

THE WISCONSIN JEWELERS' ASSOCIATION MEETING.

To the Editor of the *Jewelers' Circular*:

The second semi-annual meeting of the Wisconsin Retail Jewelers' Protective Association will be held at Janesville, Wis., February 8th, 1882. At the last annual meeting it was suggested by those present that it might be of great benefit to the craft, if each one would contribute something in the way of new modes of work, new tools, new inventions pertaining to the trade, either with specimens, or in written articles on the subjects. It is presumed that every person who works at the bench, or is in any manner connected with the jewelry business, will take an interest in everything that can be said or done to render their lot easier, or put them on the road to become perfect in their several lines. I don't presume it was the intention of those who made the suggestion, that this new departure be confined to this state, so I hereby extend an invitation to every jeweler in the country to contribute his mite towards making the coming meeting one of interest, by either writing something or sending some specimen of his work or invention, or any new tool to do work to better advantage. Any article can be sent to me at Beaver Dam, and will be placed before the Association at the coming meeting. The Association has had a good effect in the matter of having illustrated catalogues confined to the legitimate trade, and with few exceptions, the jobbers issuing them taking pains to learn who were entitled to them, thus showing that they were inclined to deal justly with the retail trade, the consequence being that it is easier for the retailer to get fair prices for his goods, than it has been for several years; but it is well that we do not stop with this improvement, but seek to improve ourselves in everything pertaining to the workbench, and it is hoped that many will contribute something to render the coming meeting both interesting and profitable.

Yours respectfully,

W. H. THORP, Secretary.

Curious Diamond Story.

RUBIES and diamonds may be bought too dearly at Rome. In March, 1879, Count Telfener paid a Roman jeweler 55,000 francs for a necklace of diamonds and rubies, the latter being valued at 800 francs the karat; but when the Count went to Paris he found, to his surprise, that the rubies were only worth 200 francs the karat. He accordingly taxed the jeweler with deceit, and demanded the restoration of his money. The jeweler consented to take back the necklace, and to give promissory notes at three months' date for the amount to be refunded, with the condition that the bills should be renewed if the necklace was not sold before maturity. At the expiration of the three months, the bills being unpaid, were protested, and Count Telfener took legal proceedings against the jeweler. These proceedings failed in the Tribunal of Commerce, and the Count was sentenced to pay the costs. He then tried the criminal side, and failed again, for the magistrates, after ordering the necklace to be impounded, decided that there was no punishable offence committed. The jeweler, thus far triumphant, next brought an action against Telfener for compensation for the damages, moral and material, suffered in consequence of the protest of the bills, the criminal action, and the impounding of the necklace, and he succeeded in obtaining a decree of 12,000 francs, in compensation for the moral injuries caused by the protesting of the bills and the penal action, the damages for the impounding of the necklace being reserved for a separate trial. Upon the hearing of the case by the Court of Appeal, the sentence of the inferior tribunal was set aside on the ground that the jeweler had himself to blame in part for the inconveniences he suffered, and that the sequestration or impounding of the necklace was the act not of Count Telfener, but of the magistrate. The jeweler pays the cost of the last, and the Count pays that of the earlier trials. Count Telfener remains without the necklace, and, for some time at least, without his 55,000 francs.

A Review of the Different Escapements.

(Translated and compiled from the French, for THE JEWELERS' CIRCULAR.)

Vertical Wheel Escapement, Fig. 24.—This escapement, the oldest of all known, as well for watches as for clocks, is still occasionally met with in common watches. It possesses the advantage of going for a long time, needs little care in its construction; but it is out of the

question to regulate it closely, and every other escapement is superior to it in this respect. Fig. 24 represents its balance, and 25 shows the arbor separately, with its pallet *a c*. It will be seen how the pallets are disposed in the verge, which is of the same piece. The escapement is almost out of date, and a farther description is unnecessary.

FIG. 25. *Flamenville's Escapement with two Reposes, Fig. 26.*—This escapement resembles the above, with the difference that the pallets

are replaced by cylinder *a b*, concentric to the balance arbor, and cut from side to side down to the center. When pallet *a* has escaped, *b* presents its roundness to the tooth, which thus makes repose while the balance continues its vibration; on its return, produced by the spring, the notch of pallet *b* permits the tooth to pass, which, while escaping, exerts its impulsion upon it.

The diameter of each roller must be a trifle less than the half of the space between two wheel teeth; these must, as usual, be of an uneven number.

The principal defect of this escapement is that it varies much with the thickening of the oil. It has, in common with the vertical-wheel escapement, the drawback of a crown-wheel dephasing, always defective in horology.

Berthoud's Mixed Escapement, Fig. 27.—This escapement holds the middle between the cylinder and the verge escapements, and partakes of their qualities and their defects. Its principal advantage lies in its easy construction, the scape wheel being entirely plane.

The cylinder is the same as that of the ordinary escapement, except the notch, for the unlocking, which here would be useless.

On the inspection of the figure, it will be seen that the escapement is alternately one of repose and recoil. As soon as part *a* of the tooth, which is cut inclined-plane shaped, falls upon the exterior surface of the cylinder, it there makes repose, in the ordinary way; the lifting at the entrance *a* also occurs in the same manner. But when the tooth has entered entirely into the interior of the cylinder, as is seen at *c' a'*, in place of the making repose, it is met by the issue lip *b*, which causes it to recoil, at the return of the balance, the exit takes place in the ordinary manner. It is therefore absolutely a cylinder escapement, in which the interior reposes are replaced by recoils.

This escapement, described by M. Berthoud, has since been taken up by Duchemin, and M. Robert has adapted it with advantage for his timers, where, he says, without having as much claim to precision as the cylinder escapement, it is greatly superior to that of the verge.

DEAD-BEAT ESCAPEMENTS.

Enderlin's Escapement, Fig. 28.—The scape wheel is here formed of two equal wheels *m n*, fastened together so as to leave between them a little distance, and in such a manner that the teeth of one correspond to the half of the space between the teeth of the other. The balance arbor carries a disc *a b*, hollowed out as per figure; the lips *a b* are grooved out to form the liftings. The reposes occur upon the smooth part of the disc. Its frictions are considerable, and they take place under unfavorable conditions, thus rendering effects variable, and contributing to the wear of the pieces. Beside this, the double wheel

gives rise to a very hurtful force of inertia; and for these several reasons the escapement has been abandoned a long while ago. Some watchmaker, however, lately resuscitated it.

The Cylinder Escapement, Figs. 29 and 30.—The cylinder escapement is nothing but an adaptation of the anchor and dead-beat clock escapements; and as such the honor of its invention belongs to the celebrated Graham (1720). Eagerly adopted everywhere, it was for some time in great favor, but subsequently abandoned for more than fifty years. Taken up again, it is to-day universally adopted. We shall, therefore, enter into such details as are merited by the importance of this escapement.

We will suppose that the arms of the Graham anchor are closed in such a manner that they span only over a single tooth of the scape wheel; that the circular reposes of its liftings are extended, in order to permit very large amplitudes to its vibration arcs; that finally, the wheel teeth and the support of the half-cylinder are shaped in such a manner as to permit the balance to vibrate freely, and the principles of the watch cylinder-escapement have been established. The lifting planes which in clocks are indifferently affixed to either the anchor arms or the wheel teeth, are in this exclusively disposed upon the wheel. Fig. 30 shows us the disposition of this wheel; *a c* is one of the inclined

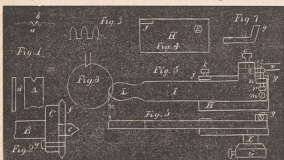
planes; *a m n* the section of the cylinder tube, reduced to a little less than one-half of its circumference, and hollow interiorly. Its exterior diameter is exactly comprised between two teeth, plus a very trifling shake, as shown in the figure by the full lines; the interior diameter is of exact size, together with a very small shake, to contain the inclined plane of each tooth, as shown by the dotted lines. In the position of the figure, the cylinder, provided with its spring, is at repose; the point *f* of the inclined plane at the extremity of the tooth *B*, is in contact with the right cylinder lip. When the wheel manifests a desire to move, the inclined plane repels the cylinder lip, which gives way by turning upon its axis; the tooth escapes, and its point *f*, now at *a*, falls upon repose upon the interior face of the cylinder with a very small drop. The cylinder, carried away by the movement acquired, continues to turn, then stops, and retrogrades at last, under the impulse of the spring, this movement producing no other effect than the friction of the tooth-point upon repose, which, for this purpose, is kept somewhat pointed (the angle rounded off, however). From the time that the left lip has entered into action with the inclined plane, the second lifting takes place, and the balance receives an impulse from the definitely escaping tooth; the tooth following falls upon repose on the exterior of the cylinder, and the balance continues its vibration freely, stops, then returns upon its steps, the tooth point solely rubbing upon its oiled and polished surface, and the same performance is repeated indefinitely. It will therefore be seen that nearly the same occurrences take place as in a clock dead-beat escapement: First, because the liftings are very nearly equal to each other, and, secondly, also the reposes.

(To be continued.)

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH.

THE first cutter which we will have to make will be the one to cut our compound or double dividing wheel, which we left two numbers back. This wheel should have sawteeth of 60 degrees, shown at Fig. 1. This will make the angle a 60 degrees, and the angle b a little less. With a fine three-square file, file a notch into a piece of steel $\frac{3}{8} \times \frac{1}{4}$ and about $\frac{1}{16}$ of an inch thick. This is your guide for turning your cutter. If the steel piece A is undercut as shown at d , it can be used as a finishing tool for shaping your cutter. If genuine cutters the blanks should be filed and ground flat on one



side, and secured to your cutter arbor with three screws. I beg to explain why three screws should be used. No matter how perfectly you turn and fit up your cutter it will spring some in hardening, and if only one nut is used for clamping of course the yield will be in the line of least resistance, and the screw of the arbor being the smallest will spring to one side, and the cutter will not only be thrown out of round, but out of true in the flat. A strong brass plate $\frac{1}{8}$ of an inch thick will take the warp out of a cutter $\frac{1}{4}$ of an inch thick and show no appreciable error, and very few cutters need exceed this thickness. It is best to let the screws be tapped into the cutter and the head rest on the brass collet, as shown at Fig. 2, and if you use steel for all your cutters of the same thickness there will be no trouble. After your blank is cut and filed nearly round it should be softened in the charcoal box, or you can soften the steel in strips and then cut out. Drill the hole for the center and fit it carefully to the post e of the arbor. A smooth round piece of steel, carefully turned, polished and hardened, should be used to burnish out the hole in the cutter to exactly fit, as a hole made by a broach will soon be a trifle too large. One side of the cutter should now be filed and ground on your glass slab perfectly flat, next drill and tap the three screw-holes, and, although the holes are exactly equidistant, let a return mark be made on the cutter. Screw the cutter to the head or collet C and turn up the face f flat and true, removing most of the turning marks by grinding. You have now your cutter blank with flat and parallel surfaces. In the present case the edge is to be turned as shown, but as most of the wheels to be cut have different shaped teeth, arrangements must be made to shape the cutters accordingly. The rounded-up tooth is formed with a cutter shaped as shown at Fig. 1. These cutters can be formed accurately by a little affair which goes into the tool post-holder. The usual curve on which the teeth of watch wheels are rounded up is a circle, diameter of which is equal to two and one-half teeth. This will be understood by inspection of Fig. 3. Cutters formed from this curve produce a nicely running train, and as the tool is presented at an angle to the tangent of the curve of the cutter, even a better form of cutter is produced than if the curve cut was a true circle. I will not here give the formula or rules for epicycloidal cutters, for in this case it would occupy too much space, but I can assure the reader that cutters formed as described will do fine work. But to those who would understand the thing thoroughly I would say that a book entitled "Sang on the Teeth of Wheels," published in London, gives mathematical rules and formula for epicycloid and involute teeth, with tables calculated to $\frac{1}{1000}$ of an inch. This is the most scientific work on

this subject published. But a thorough knowledge of differential calculus is necessary to understand it. At E , Fig. 4, is shown a piece of large wire which is as large as will go into the socket G of the rest holder of your lathe. On this is riveted a plate of No. 12 brass, shown at H , Figs. 4 and 5. This piece is $1\frac{1}{2}$ inches long by $\frac{1}{2}$ wide, and shaped as shown. At J is shown a stud through which the screw K passes. This serves to stop the lever I at the desired point. At I , Fig. 5, is shown a piece of heavy sheet or cast brass fully $\frac{1}{16}$ of an inch thick. Its form is as shown in Fig. 5, and is somewhat L-shaped, and turns on a screw at m . The piece I is drilled through in the direction of its greatest length at the dotted lines s , Fig. 5. This permits the tool g to be inserted as shown. The screw o holds it in place. The tool g should be flattened where the screw o strikes it. At n is riveted a stud through which the screw r passes. The use of this screw is to move the tool g in a slight degree in the direction of the arrow z , Fig. 5, but is to be used only for slight changes, or it will bend or break the tool g . As soon as you imagine the tool g is at the extent of its elasticity, retract r , and move the tool post holder G into a new position. After one side of your cutter is formed swing the handle L of the piece I around in the direction of the dotted curved line u until the tool g is free from the cutter a , you are turning. The cutters can be turned up on the arbor B , which goes ultimately into the cutting engine; but in this case you must have double centers to your lathe; but about the best way is to make a chuck to screw into your lathe, which represents the arbor shown in Fig. 2, both in the exact size of the part e and collet C .

In this last mentioned case, but one lathe center is required. After swinging around the handle L , as mentioned above, remove the cutter v , and reverse the sides and repeat the process; now, of course both sides of your cutter must be exactly alike. The manner of roughing these cutters with a graver has already been described; the graver will best roughen the concave part, but the extreme edge (which is flat) can be cut into ratchet shaped saw teeth by your cutting engine. A cutter $\frac{3}{4}$ of an inch in diameter should have about 150 teeth. A slight modification of the attachment described in my last article, enables one to produce new "frazes" for rounding up tools quite rapidly; this, however, will be taken up further along. Cutters for cutting some of the Swiss stem-wind teeth (wolf-teeth), or epicycloidal, as some term them, are turned up by the eye, using the old wheel as a guide, applying it to the cutter as the work progresses, until the edge of the cutter corresponds exactly to the form of the tooth. Ratchet teeth are formed with a cutter which presents an angle of about 52 degrees; this enables the teeth to be slightly undercut; of course, to do this, the cutter is placed to one side of the center, as shown in Fig. 6. The compound spacing wheel described is cut with the cutter exactly over the center of the wheel, and the sizes given are exactly calculated to allow for the proper protrusion of the teeth beyond the pitch line. I will beg to call the reader's attention to an error in the cut in last number; it arose from a tendency to reverse in printing. In the cut showing the swinging piece carrying the cutting arbor, the pulley on which the drill bow cord runs, is shown as being in front; it should be on the side away from the operator, and the cutter nearest to him. Two Figs. 5 are shown in the cut, the lowest one being an edge view of the upper. Three or four sizes of such cutters as cut the wolf-teeth wheel, will match almost any wheel; one ratchet cutter, and seven or eight sizes of cutters for rounded up teeth, will cover a much greater range of work than one would imagine. For cutting chronometer "scape" wheels, this form of cutting engine cannot be excelled; as the spacing is unusually accurate, and therefore avoiding a trouble which is frequently noticed, that although the teeth appear to be even, there is a troublesome error existing between the tooth resting on the locking jewel, and the one near the impulse jewel, it is in fact the aggregate error of these teeth. The angle of a chronometer scape tooth on the straight side is (generally) 28 degrees, and best cut by making it two operations.

Guide for Watchmakers' Apprentices.

BY HERMANN SIEVERT.

[Continued from page 304.]

Giving all pinions an equal number of leaves and diameters, facilitates the work very much—inclusive the equality in thickness of wheel teeth. No objection stands in the way, as wheel teeth in clocks, in comparison with the demands made of them, are more than sufficiently strong. In order to obtain depths as perfect as possible, use 12-leaf pinions.

1.	{ Drumwheel, 180 teeth, dia. 97.6 mm., depth. dist. }	51.2 mm.
	{ Center pinion, 12 leaves, " 7.05 " " " }	
2.	{ Center wheel, 96 teeth, " 52.8 " " " }	28.8 "
	{ Center pinion, 12 leaves, " 7.05 " " " }	
3.	{ Third wheel, 96 teeth, " 49.6 " " " }	27.2 "
	{ Scape pinion, 12 leaves, " 7.05 " " " }	
	{ Scape wheel, 30 teeth, " 36.6 " " " }	

The tooth thickness of wheels is 0.804 mm.

Thickness of drum wheel 2.0 "

" " center " 1.50 "

" " third " 1.25 "

" " scape " 1.00 "

Pivot thickness for anchor arbor 1.0 mm.

" " of scape pinion 1.0 " and 1.2 mm.

" " third pinion 1.2 " and 2.5 "

" " center pinion 1.3 " and 4.8 "

" " drum " 2.0 " and 4.8 "

" " maintaining power 1.3 "

The Fork of the Glashütte pendulum clocks is provided with a peculiar contrivance for correcting the drop, as shown in Fig. 9.

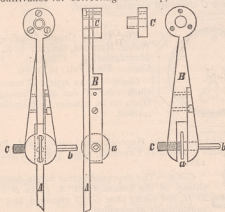


FIG. 9.

Fork *A* has, where its thin, straight form widens into a disc, a slit. In this slit moves, without shake, the little steel plate *a*, which is made with the square *b* and the screw *c* of one piece. The plate rests with square and screw within the piece *B*, which for the purpose must be made of two pieces screwed together. *A* and *B* are upon and with the lining *C*, immovably connected by three screws. Now if with a watch key the steel plate is turned to one side, its plane will assume a different direction to the longitudinal axis of the fork piece *A*, and if the disc fits exactly in the afore-mentioned slit, the fork must bend somewhat. The advantage of this contrivance is that any becoming loose of the parts is completely prevented. Beside, such a fork is preferable for its lightness, especially at the lower part, to the common ones generally used by regulators.

The Pendulum.—The choice of the pendulum is a very important question. Nearly all bodies, more especially metals, most used in pendulum rods, expand with heat, and a clock with such a pendulum will go slower in hot weather. But the expansion is not the same by all metals; while soft steel increases, from 0 to 100° C., by 0.001079, or $\frac{1}{927}$ of its length per degree, zinc dilates 0.002924, or $\frac{1}{342}$, and mercury as much as 0.00606, or $\frac{1}{164}$. This peculiarity of the metals

has been made use of in the compensation of pendulums, and by uniting different metals, the effects of expansion are equalized—compensated. Best of all is the gridiron pendulum, composed of steel and zinc. It must, however, if intended to compensate correctly, be very closely calculated and constructed. A mercury pendulum also gives excellent services, compensating with its expansion of seventeen and one-half corporeal dimensions, the expansion of the steel rod; it suffers with the great defect that in heated rooms, owing to the differences of temperature in the upper and lower strata of the room, it renders no satisfactory services, and, consequently, is not good for workshops and stores.

The cheapest and easiest of construction of all pendulums, is one with a rod of wood. Well-dried wood has almost no expansion, and if well protected against the humidity of the air, it is best of all. Procure a long, straight-grained, thoroughly dried rod, free of knots, with beveled corners, to offer as little resistance as possible to the air. Heat it gently, and dip it in thin varnish, to fill the pores. It would be wrong to plunge it in suddenly, because the air contained in the wood, would thus not be able to escape, and prevent the varnish from penetrating. First dip in one end, and you will see the capillary action of the small wood cells, how they imbibe the varnish. Proceeding with caution, step by step, the air will all be driven out, and the rod be handsomely varnished, and kept from being influenced by humidity.

The weight of the entire pendulum should not be less than three kilog., the weightier the better. For its suspension, always take two springs, as thin as consistent, of fully 3 mm. breadth. Do not make the brass cheeks any longer than is actually requisite for the secure fastening of the springs, as the total expansion of the brass must also be taken into account. A pendulum of such a weight only needs to have the springs 3 mm. in the clear.

The case must be as firm as possible, and close dust tight. The practice of putting panes in the sides is rather reprehensible. Pendulum, work and weights are objects of no insignificant ponderance, and a case in which glass predominates, especially if to be suspended, has oftentimes not the requisite firmness, and is apt to draw out of shape. I would advise, where it is at all practicable, to have a standing frame; this, of course, must also be fastened to the wall with its upper end, to keep it firm and steady.

A FEW HINTS.

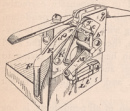
The Frame.—For the plates, take of the best plate brass, about 8 mm. thick, and each piece as large as two-thirds of its intended size. By hammering, the necessary size and thickness will be obtained. The more thoroughly the pieces are hammered, the easier will be the filing; if they have been reduced by the operation to about one-half their diameter, remove any arisen tension by burning off with talloil.

When the hammering has been finished, file the plates smooth, and to their prescribed thickness, 3.8 mm. Next connect them by two well fitting pins, drilled in as far apart as possible, and together file them to their correct shape. Before taking them apart again, mark them, to subsequently put them together again in the same way. After having finally smoothed them, by removing all the coarse file strokes, transport upon them with the help of a millimeter gauge, the entire sketch, together with the depth distances, upon one of the plates. If you have a drilling tool, you may drill all the holes in common through both the plates, and for this purpose make the sketch upon the outside. If your shop does not contain it, sketch the holes upon an inside, and drill first only one plate, inclusive the pillar holes. Then fasten the plates together again by the first holes and pins, and drill the holes of the original plate lightly into the other, take the plates asunder, and finish the holes as straight as possible. This precaution prevents the possibility of drilling the holes obliquely in both plates, even if by accident they should have become so, or one or more of them, in the original one. You may now widen the pillar holes to their required dimensions.

(To be continued.)

Patents.

DEVICE FOR MAKING VERGES AND PENDULUM RODS.—Arthur E. Hotchkiss, Cheshire, Conn. Filed Jan. 25, 1881.



Claim.—1. The combination, with a pallet supporting block and levers for retaining the pallets therein, of supports on opposite sides of the pallet-block for supporting the verge shaft, substantially as set forth.

2. The combination, with a pallet-supporting block, or plate and devices for retaining the pallets in place, of supports on opposite sides of the pallet-block for supporting the verge-shafts, and a

lever adapted to prevent the displacement of the verge-shaft, and a substantially as set forth.

3. The combination, with devices for retaining the pallets and verge-shaft in place, of a device for retaining the pendulum-wire in the verge-yoke until secured thereto by solder, substantially as set forth.

4. The combination, with devices for retaining the pallets and verge-shaft in place, of devices for retaining the pendulum-wire in the verge-yoke, and devices for securing the lower end of the pendulum-wire in any desired adjustment, substantially as set forth.

5. The combination, with devices for securing the pallets and verge-shaft in position, of an adjustable pendulum-wire gauge-block and a clamp for retaining the pendulum-wire in position, substantially as set forth.

6. A device for fitting combined pendulum-wire and verge, consisting, essentially, of a pallet-supporting block or plate, spring pressed lever or levers for securing the pallets in place, a spring-pressed lever for securing the verge-shaft in place, a spring for securing the pendulum-wire in the verge-yoke, and an adjustable gauge-block and pivoted spring-clamp for retaining the pendulum-wire in proper adjustment, substantially as set forth.

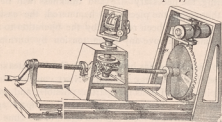
STEM-WINDING WATCH.—Joseph W. Hurd, Rockford, Ill., assignor to the Rockford Watch Company, same place. Filed Mar. 21, 1881.



Claim.—1. In a stem-winding watch, the combination of the pivoted swinging lever *a*, provided with the wheels *b* and *c*, which engage each other, with the wheels *p* and *g*, and the pivoted oscillating yoke *e*, provided with the wheels *h*, engaging the wheel *d* on the swinging lever, said members being organized for operation substantially as and for the purpose described.

2. The plate *j*, provided with a hub *k*, to receive the crown-wheel *o*, and a flange *l*, forming a bearing for the winding-pinion or stem of a stem-winding watch, substantially as and for the purposes specified.

METHOD OF AND APPARATUS FOR DEMAGNETIZING WATCHES.—Hiram S. Maxim, Brooklyn, N. Y. Filed Sept. 7, 1881.



Claim.—1. The method of demagnetizing watches or other similar articles of or containing steel, which consists in subjecting the same to rapid reversals of polarity in a gradually weakened magnetic field, substantially as described.

2. The method of demagnetizing watches or other articles of or containing steel, which consists in gradually withdrawing them from the influence of a rapidly alternating magnetic attraction, as set forth.

3. In an apparatus for the demagnetization of watches or other articles, the combination, with an electro-magnet and means for revolving the same, of a rotary holder for presenting the articles under treatment to the influence of said magnets, and mechanism, as described, for withdrawing them from the magnets, substantially as described.

4. In an apparatus for the demagnetization of watches or other articles, as described, the combination, with the revolving magnet, of a movable frame or carriage, a holder for the watch mounted thereon, and means for rotating the holder simultaneously in horizontal and vertical planes, as and for the purposes specified.

WATCH-CASE SPRING AND HOLDER.—Richard F. Burke, Rochester, assignor, by mesne assignments, to J. Henry Parker, Trenton, N. Y. Filed Aug. 16, 1881.



Claim.—1. In a watch-case, the combination of the curved spring *A*, constructed with the serrated heel *z* at one end and the extended curved lip *b* at the other end, the block with curved recess, and a fastening-screw for securing the spring in position without passing through the spring, substantially as described.

2. The means hereinbefore described for securing in position the curved spring that actuates the cover of a watch, consisting of the beveled-shaped block provided with the curved recess on the inner face and the metallic screw secured to the case.

SLEEVE BUTTON.—Clarence L. Watson, Attleboro, Mass., assignor to Watson & Newell. Filed Aug. 15, 1881.



Claim.—In a sleeve button, the front portion, *A*, the shank *B*, having diverging legs, and the square bar *z*, formed at their outer ends, in combination with the disk-plate *D* of the shoe *C*, having the flattened loop *g*, and the oppositely arranged slots *g*, contiguous to the said loop, and the spring *h*, the whole constructed substantially as described, whereby, by the peculiar formation of the disk-plate *D*, the diverging shank may be first soldered to the button, and the shoe *C* afterward secured in place.



CUT GLASS CLOCK CASE.—James H. Welch, Hartford, assignor to E. N. Welch Manufacturing Company, Forestville, Conn. Filed Feb. 16, 1881.

Claim.—As an article of manufacture, a clock case of cut glass having polished facets on its exterior, substantially as described.

SLEEVE BUTTON.—John Hancock and Levi Richards, Providence, R. I., assignors to David B. Churchill, same place. Filed July 11, 1881.



Claim.—The improved button herein described, consisting of the button front *A*, posts *B*, *C*, springs *D*, *H*, and tilting shoe *G*, all arranged and operating substantially as specified.

STRIKE-SPRING FOR EIGHT-DAY CLOCKS.—Benjamin B. Lewis, Bristol, assignor of one-half to Welch, Spring & Co., Forestville, Conn. Filed July 31, 1879.



Claim.—1. The double spring composed of two connected halves coiled in opposite directions, in combination with the striking mechanism of a clock movement, substantially as described, and for the purpose specified.

2. The double spring composed of two connected halves coiled in opposite directions, in combination with the main driving-wheel and count wheel of an eight-day clock, both wheels mounted on the same axis, and specially adapted for making at least sixteen revolutions, substantially as described, and for the purpose specified.

3. The main shaft, shouldered as described, in combination with the double spring, spring-barrel having a solid bottom or end, dividing-disk, hollow shaft or hub, main driving-wheel, and movement plates, the solid end of the spring-barrel being interposed between one shoulder of the main shaft and the movement plate, substantially as described, and for the purpose specified.

4. In a double spring for clocks, the peculiar fastening for the ends, consisting of the connecting bar passing through elongated eyes and clinched down without riveting, substantially as described, and for the purpose specified.

5. In a clock movement, the click spring *c*, having wing *m*, in combination with the sheet metal frame having a shallow notch in its edge, which receives the wing, substantially as described, and for the purpose specified.

BRACELET.—Herman Unger, Newark, N. J. Filed Sept. 8, 1881.



Claim.—1. A bracelet formed from one piece of sheet metal having its edges inwardly returned and its extremities overlapping, and arranged to operate substantially as and for the purposes set forth and shown.

2. In combination with the body of a bracelet formed from one piece of sheet metal and having its edges inwardly returned, a spring secured between said returned edges, substantially as and for the purposes set forth and shown.

3. In a bracelet, the combination, with the body formed from one piece of material having inwardly returned edges, of the spring *a* and end caps *c*, all arranged to operate substantially as and for the purposes set forth and shown.

CHAIN WORK FOR JEWELRY.—Emile Vieille, Providence, R. I. Filed May 21, 1880.



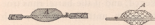
Claim.—Chain work for jewelry, formed of interlocking spiral wires *A* and cross bars *B* in every other coil, the side edges, *C*, of said cross bars and wires being folded over the body of the chain-work, whereby soldering is rendered unnecessary, and polished cross bars may be employed, as described.



STEM WINDING WATCH.—Albert Chopard, Moutier-Grandval, Switzerland, assignor to the Société Industrielle, same place. Filed Sept. 23, 1881.

Claim.—The combination, in a stem-winding mechanism, of the rocker *M*, pivoted upon the pillar-plate, the gear wheel *c*, turning upon the tubular arbor *a* of the rocker *M*, the wheel *D*, the arbor of which is upon the rocker *M*, the wheel *B*, the stem and crown or head *A*, the winding gear *E*, and setting gear *G*, substantially as set forth.

IMITATION PRECIOUS STONE.—Francis Ed. Meyer, New York, N. Y. Filed Sept. 2, 1881.



Claim.—As a new article of manufacture, the imitation precious stone for window and similar ornamentation, consisting of a central raised or stone part *A*, made plain or faceted, and a surrounding flange *B*, the whole formed in one solid piece, substantially as described and set forth.

MANUFACTURE AND SETTING OF TRANSPARENT AND TRANSLUCENT PRECIOUS STONES, ETC.—Francis Ed. Meyer, New York, N. Y. Filed Sept. 2, 1881.



Claim.—A transparent or translucent real or imitation precious stone, composition of glass or paste, formed of two parts, *A* and *B*, the adjacent faces of which are coated with some highly reflective substance, as described, and the two parts securely fastened together, either by a firm cementing placed between them or by the setting-holds of *D*, substantially as described.

ADJUSTABLE MINUTE DIAL FOR WATCHES.—Henry B. Cobb, Wilmington, Del., assignor to himself and Geo. E. Buckley, Philadelphia, Pa. Filed Mar. 22, 1881.



Brief.—On the periphery of the crystal is a minute dial.

Claim.—In combination with the ordinary fixed or stationary dial-face of a watch, a movable transparent crystal containing a minute-dial face concentric with the dial of the watch, whereby the hour-hand indicates about the hour on the watch-face dial, while

the minute-hand indicates the minute of the hour upon the watch-crystal dial, both dials being observable simultaneously, substantially as described.

CHUCK FOR WATCHMAKERS.—Samuel I. Snyder, Clearfield, Pa. Filed June 27, 1881.



Claim.—The combination of the independent adjustable dogs *C*, having outer and inner holding jaws for watch barrels and watch wheels, and constructed with rear rack faces, *A*, and intermediate necks, *g*, with the slotted face-plate *A*, having rear central hub, *B*, and the scroll plate *D*, fitted on the latter, as and for the purpose set forth.

Diamonds and Precious Stones.

Translated for the JEWELERS' CIRCULAR from the French *Diamonds et Pierres Precieuses* par Louis Desbailly, Professeur de géologie et de Minéralogie à la Faculté des sciences de la Sorbonne. 2me ed. Paris, 1874.

[Continued from Page 279]

HISTORICAL SURVEY OF PRECIOUS STONES FROM THE MOST REMOTE TIMES OF ANTIQUITY TO THE ERA OF MODERN CHEMISTRY—NOTIONS ENTERTAINED BY THE ANCIENTS AND DURING THE MEDIEVAL AGE CONCERNING THEIR NATURE AND PROPERTIES.

EXCEPTIONAL DIAMONDS—CONTINUED.

Brazil is the second home of precious stones, and it is but natural that it should possess a great quantity; the collection included in the treasury amounts to more than 100,000,000 francs. Among its principal diamonds is one which, cut pyramid form, ornaments the gold cane handle of John IV.; it is estimated at 872,000 francs. Brazil also has furnished the twenty diamonds forming the buttons of the robe of ceremony of Joseph I.; each one is valued at 125,000 francs; the complete costume represents a value of 2,500,000 francs.

This extraordinary diamond was found in 1853, in the mines of Bogavan, by a poor negress. Crude, it weighed 277½ karats, and was bought by M. Hephien.

From the first moment of its appearance in commerce, this diamond has attracted the attention of lapidaries, who, to distinguish it from the known ones, have named it "Star of the South." When cut, it will lose about one-half of its weight, and be reduced to about 125 karats. Still, this weight will place it in rank with but four or five known diamonds." (M. Dafrény.)

To-day, the Star of the South has been cut in the establishment of M. Coster, at Amsterdam. It is of an irreproachable purity, white, but taking a noticeable rose-tint color by reflection. Among the diamonds which come from Brazil, we must cite three other large ones of the King of Portugal.

The first bears the name of King of Portugal. It was found in a place called Cay-de-Mérin, near the little river Malhoveiro. Mawe says that it weighs 1,680 karats, and the native experts estimate it at a value of \$1,395,000,000. But—some think that it is nothing but a topaz, and in this case the millions vanish. No one is allowed to see it, and it is still intact, which secretly tends to strengthen the doubt. Nothing would be easier than to apply the test by exposing it for one moment to the cutter's lathe; and because this simple, but expeditious way is not adopted, the doubts appear to be well founded.

The other two stand free of suspicion. The first weighs 215 karats; the other, being flat, is of a little less weight. These two beautiful stones were found to the east of the Minas Geraes, in the River Abayé, by three men banished to the interior.

England.—The crown of England is very rich in beautiful diamonds, but the chief treasure is the famous Koh-i-noor (Mountain of Light). This, according to the legend, is the oldest diamond known, having already been worn by Karma, King of Agra, who lived 3,000 years before our era.

Whatever be its antiquity, it was found in the treasure of Shah Shaiya, ex-king of Cabul, and it passed by way of conquest into the hands of Rundjet Singh. This fastidious despot, the accoutrements of whose horse were already embellished with 75,000,000 of diamonds, caused the Koh-i-noor to be mounted in the pommel of his saddle. Having become the property of the East India Company, they offered it to the Queen of England. It weighed 186½ karats, and was estimated at 3,500,000 francs, but it was of bad shape. It was recut, and at present weighs only 102½ karats.

Beside the Koh-i-noor and a great number of pearls, the crown of Queen Victoria is adorned with 437 diamonds, the price of which is held at 2,000,000 francs.

Another well known diamond is the Piggott, which was brought from the East India by a count of that name; its weight is 81½

karats. It was put in lottery in 1801, at the sum of 750,000 francs. Later, it became the property of the Pacha of Egypt, who paid for it the same sum. Its possessor is not known at present.

The Nassak or Nassac is of triangular form with curved faces. Conquered during the ancient wars in the territory of Mahratta, it was at one time the property of the East India Company, and weighed then 89½ karats. Bought in 1818 by MM. Rundell and Bridge, it was later on sold at public auction, when these traders retired from business. The Marquis of Westminster, to whom it next belonged, had it recut; it weighs to-day 78½ karats, but has infinitely increased in form and brilliancy. It is estimated at from 750,000 to 800,000 francs. *Russia*—The country richest in day in beautiful diamonds is perhaps Russia. Beside the special collection of diamonds, there are in the treasury of this empire, three crowns completely formed of them. The first, that of Ivan Alexiowitch, contains 881; that of Peter the Great, 847; and that of Catharine the Great, 2,536.

Among the large Russian diamonds, the most remarkable is the Orlov. It weighs 193 karats, and has the shape of half an egg. It is one of the ornaments of the Imperial scepter. This beautiful diamond was brought from India. About a hundred and fifty years ago, it was one of the eyes of the famous idol of Seringham, in the temple of Brahma; the other eye was a diamond of the same size. This fact being undoubtedly well known in the country, prompted a French soldier in the Indian possessions, at the commencement of the eighteenth century, to gouge out the eyes of this celebrated idol. He is suddenly inspired with great fervor for the Hindoo religion, and succeeds in gaining the confidence of the priests in such a measure as to be appointed guard to the temple. He chose his own time, and during a tempestuous night, he succeeds in picking out only one of the diamonds, unable to force the other from its socket, and flees to Madras, where he sold it for 50,000 francs to a captain of an English ship. Brought to England, it was purchased for 300,000 francs, by a Jew, who afterwards sold it to Catharine II. for 2,400,000 francs, and pension for life of 100,000 francs.

The diamond Shah, is another beautiful Russian diamond, and belonged to the ancient sophis of Persia. It is of very fine water, and weighs 95 karats.

The third is called the "Moon of the Mountain." It was bought for 50,000 piasters of an Afghan chief by an Armenian merchant, named Schaffans, who owed it for two years, and sold it by one of his brothers to Amsterdam to sell. After much bargaining it was bought by Russia for 450,000 silver roubles (1,800,000 frs.) and a patent of nobility.

Russia also possesses a beautiful brilliant red ruby of 10 karats. It was bought for 100,000 roubles, (400,000 francs) by Emperor Paul I. We finally mention that superb diamond, the Polar Star, cut as brilliant, and weighing 40 k. It belongs to the Princess Yousoufowitch. *Austria*—The handsomest Austrian diamond is the Grand Duke of Tuscany. It is a little yellow, cut with nine faces, forming a star of nine rays. This diamond belonged to Charles the Bold, who lost it at the battle of Granson. Found by a soldier, it was sold by a Genoese merchant to Ludovico Sforza, duke of Milan. It became afterward the property of Pope Julius II., who made it a present to the Emperor of Austria. This diamond was, at Granson, accompanied by another smaller one which Charles the Bold wore around his neck.

It is to-day a part of the jewels adorning the Papal tiara in Rome. The Grand Duke weighs 139½ karats.

Egypt possesses a very handsome diamond of 40 karats, bearing the name of Pasha of Egypt. It cost 700,000 francs.

There is one diamond in Holland of 36 karats, held at 260,000 francs, and another one in the Treasury at Dresden, which weighs 31¼ k.

An entirely black diamond was sold by the Marquis de Louvois, in 1711, for the sum of 24,000 francs, but was never delivered; it was cut very small, and had a remarkable luster.

We will close the list by mentioning one brilliant exception amidst this array of Nature's marvels—the blue diamond of Mr. Hope. Its weight is 44½ karats, thus being fit to be classed in the second rank by its dimensions; but in virtue of its blue color surpassing that of the most beautiful blue sapphires, together with the brightest of adamantine luster, it truly is without a rival. It was bought for 450,000 francs, while, according to the opinions of experts, it is really worth more.

ENGRAVING DIAMONDS.

In spite of its prodigious hardness the diamond has been engraven; a specimen could be seen at the Universal Exposition in 1867, in the Italian section. It was engraven in the sixteenth century by Jacopo or Come de Trezo, and was set in a unique cylindrical ring.

[The author, in the following chapters, enters into voluminous details on the nature and composition of the precious stones; and since we do not wish to garble his work, we have held it more advisable to bring it to a close with the chapter on diamonds.]—THE EDITOR.

Practical Treatise on the Adjustment of a Cylinder Watch.

(Translated for THE JEWELERS' CIRCULAR from the 3d-price essay of Vincent Lauer.)

Continued from Page 292.

Next fasten both plate and cap in the universal head, in such a way that the cap stands toward the plate form. Also a smaller plate may be fastened upon the larger one by three or four screws, and equally perforated in the center like the latter. Instead of shellacking the cap upon it, lay it upon the plate, cover it with the smaller, and tighten this with screws. By either way, the cap is turned smoothly from the center outward, while, if the cap were locked or screwed on the plate with its upper side, its uniform thickness would become a matter of question—a condition which is seldom found.

When the ratchet moves smoothly with due friction between bridge and cap, turn your attention to the clickwork. Mount the spring in its place, and see if it will lie well and firm; examine if its hook reaches down to the bottom of the teeth; should it reach a little only over half the tooth length, move it closer to the ratchet; if this is too small, however, (a defect which should be noticed at the preliminary examination) and there is a risk that the bridge might be weakened too much by a filing, it is best to replace the barrel arbor. If the barrel moves between two bridges, the defect is more easily remedied by simply mounting a larger ratchet.

The clickspring as well as the ladder must be flat at the place where they will lie together; the latter must be sufficiently long that at least the hook reaches to the middle of the ratchet; generally it reaches a little beyond; it must not be much, however. The elastic part of the click-spring must stand in due proportions to the resistance brought to bear against it; if the spring is too strong, it will produce a quick wear of the hook; if too weak, it offers no security to resist the tension of the mainspring which acts upon it. It is advisable to provide the ratchet foot with at least one foot pin; if you do not wish to go to this trouble, see that the ratchet foot, together with the lower side of the bridge, stands upon it smoothly and with every part, and thus obtain a secure position.

The operating part of the hook must stand at right angles with the length of the spring, to prevent it being pressed to one side. If you find that the click-spring is not sufficiently hard, retemper it. I do as follows: First I let the spring turn red upon sand or filing dust, then I seize the hook between the jaws of tongs, and heat the other part, especially the weaker, until it turns light blue.

Bridge, barrel arbor and clickwork are now in order, and the barrel may be mounted. If its holes are suitable, the pivots well polished, and that they have not become weakened, and if the barrel runs true and smooth, leave it as it is. Should it run untrue, however, with suitable holes, see if this defect cannot be remedied by transposing the cover; move it little by little, and examine the running of the barrel every time. A correction is by this obtained oftentimes, and when the right place is found, mark it by points on the cover and rim. Should this procedure not remove the fault, broach the cover hole, turn a bushing with hole much smaller than necessary for the pivot, and rivet it. Shellac the barrel upon the lock chuck of a chuck tool, and set it truly round with the hole; when the lock has well hardened, spring in the cover, and turn the hole in the bushing with a tapering ground graver, until truly round. If the cover was not inserted in correspondence to marks, make them now. It is a great advantage to have a support for the turning lathe; the bushing may then be turned flat on both sides, also the inside of the barrel may be corrected, if necessary. I proceed in the same manner, whenever both holes require bushing; if the barrel is out of round, and the depth betrays the fact, I leave the bushing holes small, and set the barrel according to the tooth points, and then turn both bushings. In this manner I obtain the barrel round and flat, well with the little extra trouble.

Again, it occurs that the barrel between the upper arbor shoulder and the core has too much useless space; this defect is often corrected in a manner productive of another one; the core is sometimes turned off, to be screwed deeper down, thus placing itself upon the

arbor shoulder. By this procedure, which I will not altogether depreciate, the core approaches the barrel bottom, and is removed from the cover; if the core formerly stood equi-distant between the two covers, it now is closer to the lower than the upper one. Not considering the irregularities following in the train of such a procedure, when winding the spring, the inner spring end of the hook is crowded against the barrel wall, producing an important friction, sometimes of a quantity sufficient to annul the power altogether. If, with too long a pivot there is too much shake present, it may be remedied in the indicated manner; the shoulder of the thread also may be turned off, a procedure which appears to me to be preferable; if, however, the difficulty arises from the barrel, because the shoulder is not sufficiently high, lift it with a bushing with shoulder, and permit it to protrude sufficiently within to occupy the superfluous shake. Also see that neither the barrel-bottom nor its rim are unduly thick, so as to make use of the inner space for some more valuable purpose.

The barrel wall and cover, for watches of common size, offer sufficient resistance when 0.25 to 0.30 thick; more is superfluous, and turn it out; do the same with the rim—it merely occupies valuable space—and the lever upon which the spring operates is shortened. The graver's edge must be very sharp and polished, that the turned surface become clean and smooth; in finer movements, finish by grinding with a fine slate and oil, to prevent a possible hanging of the spring on the walls.

If the barrel hook is unserviceable, or accidentally turned off, insert a new one in the following manner: Drill a hole in the rim and cut in a thread; next file a brass pin in such a manner that it protrudes a short distance through the corresponding hole of the screw-plate, and cut it off at a short distance from the latter. On this protruding part cut the hook, then seize the long end and screw it out backward. Insert this piece from within through the hole in the barrel rim, seize the end with a tongs, and tighten the hook from within to the outside.

If the core hook is bad, replace it also by a new one. I would remark in this connection that both bodies, especially that of the core, must not be longer than the thickness of the spring.

The barrel being regulated in this manner, put it together and examine the depth with the center pinion. It is best to be able to see a depth; to judge it by touch requires an extensive experience, and the practiced hand will occasionally err in this respect; the encounter of a depthing often appears, by the touch, to be a recoil, and *vice versa*. Again, a depthing may feel to run smooth and in order, yet be far from it. When investigating one, take notice before anything else, whether it is conditioned thus that the pitch circles of wheel and pinion touch upon the line of centers, and that the depthing occurs without shake or recoil, that the tooth does not rub upon the leaf bottom, that tooth and leaf do not pinch each other, etc. It is not by any means such an easy matter to judge a depthing, as many watchmakers appear to imagine; much knowledge of the theoretical part of this important subject is necessary, as well as long continued practical experience, to obtain the utmost perfection; it is not practical to refuse all parts in common watches, and the watchmaker has to make the best of the material on hand.

In order to see the depth of barrel and center pinion, file in a little notch, near the center-pivot hole, in the plate; this opening must not be too large, so that you may afterward bush the center-wheel hole, without encountering difficulties.

Should the depthing be too deep, round the teeth a little lower; if too shallow, move the bridge somewhat closer. For this purpose put it in its place and draw it tight with two soft screws. Next put a piece of bone or hard wood upon the side of the bridge, and drive it more to the center. Also put the plate against a piece of wood, so as not to damage it. Use soft screws for this purpose, hard ones are apt to snap.

This is sufficient, when a depthing is only too shallow by a trifle; if of magnitude, it is best to insert a new barrel. Should the remuneration not be adequate, or you desire to retain the barrel for other

reasons, you may do as follows: Open the foot-pin holes on the side toward the center wheel by filing, so much as you intend to deepen the depthing; next open them still more by broaching, in order to insert a bushing. Take care to retain the distance of both holes, and it is better to first bush one of them, and to turn and smooth it flat on the sides; next mount the bridge and examine whether the foot pin will exactly occupy the center of the hole, after it has been opened by filing and broaching. When both holes have been duly bushed, the original screws will have become useless, because the holes of the bridge will not concur any longer with those of the plate. To reduce them to order again, mount the bridge, and fasten it together with the plate in the universal head, by centering in accordance with the threads in the plate; fasten the clamps at once over both plate and bridge, in order to retain the latter. The countersinkings for the screw-heads are turned larger until they become round, and, if necessary, the holes in the bridge are sufficiently opened by filing, until they concur with those of the plate; new screws with larger heads are thereupon inserted.

The depthing being in order, we bestow our attention on the stop-work. Whether it may be retained, or has to be replaced, in whole or in part, we have determined at the taking down of the movement. If the barrel has been shifted in order to correct the depthing, examine again that the female stop does not come into contact with the hour wheel, which may not have been the case originally. If the parts are fit for use, arrange the female stop that it revolves easily but securely, and does not fall from side to side. Round the tooth points by a trifle, test the temper of this part, etc. These parts are often good, but do not touch each other securely, and interferences may occur. If so, see whether the female stop-hole be not too large; should it be, you may, with a punch, flatten the shoulder in the cover, if sufficiently high; two faults are often corrected by this at once; the screw may have been too high originally, and the female stop was not retained securely.

The male stop must be well round and have no rough places anywhere, on which the female stop teeth might hang. If the parts are not suitable because not in right proportions to each other, or that, as already mentioned, the female stop comes into contact with the minute work, the different parts must be replaced, either in whole or in part.

If the space for the stop-work, or rather for its points of revolution, has been determined, and we have to choose the suitable parts, find a finger with a diameter after being turned round, corresponding to the distance of both points of revolution, fit it upon the arbor square, which is to be examined first, however, whether it stands in the middle of the arbor, and is otherwise in a condition to securely keep the tooth. Should the square be out of center, correct it by filing.

At the choice of a female stop, place it against the rounding of the tooth, and compare whether the hole in the wheel concurs with the cover shoulder. Having found such a wheel of suitable size, broach the hole sufficiently that it fits easily upon the shoulder without being able to fall to and fro, and countersink for the screw-head. There are tools for this purpose, to be had at all watch-material stores, which are very suitable for the purpose. In want of such a one, shellac the female stop upon a chuck of the chuck tool, and turn the sinking with a graver with a cutting point somewhat flattened. When done, insert a suitable screw, by which the wheel is held secure, without contracting its free motion.

You may now test the stop-work, whether all its wheel hollows slide gently, but securely, upon the rounding of the male stop. If even only one tooth passes through freely, it must be regarded as a proof that the male stop rounding is correct, and the subsequent difficult passage of the others has to be corrected by filing. The stop is next filed in such a manner that the wheel advances securely without adhering anywhere or pinching. When satisfied that everything is in order and serviceable, the stop is notched to admit of a pin before it.

[To be continued.]

Art Work in Gold and Silver.

TOURISTS in Europe seldom fail, in passing through Dresden, to pay an afternoon visit to the famous Grüne Gewölbe, which is hallowed by many examples of the workmanship of Dinlinger, whose designs in gold and gems were the marvel of the Middle Ages. One of the most remarkable works of the father of German jewelry is a cock's head of pearl and enamel, so delicately finished that it can be examined with a lens. The head, which is presented in profile, is composed of a single large pearl, oval in shape, and the beak of a second pearl of the purest luster. In the center of the broad blazes a brilliant ruby. The crest is perfectly reproduced in crimson enamel. The feathers, of vivid green enamel, are so small that they are scarcely visible to the naked eye; but when examined by the aid of a lens, each is so perfect in finish that the beauty of the workmanship is rather enhanced than impaired by a test that would destroy the illusion in most instances.

There is a popular fancy at the present time in New York fashionable circles for copies of those rare works of ancient and mediæval art, and such terms as Assyrian, Indian, Classic, Roman, Pompeian, and mediæval have become as common on the lips of ladies of fashion as the names of the paragon gems themselves. The design just described will ornament the scarf of one of the leaders of fashion this winter; and the copy is pronounced by good judges more perfect in detail, even to the microscopic feathers, than the original, which probably occupied the grim old German artisan for months. Only one has yet been made, but forms equally grotesque and curious in amethysts and tourmalines, aquamarine, Oriental topaz, and other gems of minor value, are in constant demand for scarf pins. The popularity enjoyed two or three years ago by these minor gems, some of which are very beautiful in color and luster, has departed as suddenly as it appeared, except in cases where they can be made to serve as the basis of some design in cameo or intaglio—a classic head, a group of cupids, a psyche, or possibly a simple pansy blossom, whose center is lighted by a solitary ruby, while the leaves of the corolla are cut with wonderful attention to detail in the less brilliant stone. A pansy or a daisy cut in amethyst, with a yellow diamond or a ruby for the center, is, in fact, considered particularly appropriate as a lace pin for a lady; and since Spanish lace, point Mauresque, and other delicate fabrics not too high in price have come into fashion, the demand for such trinkets has trebled, and the invention of the jeweler is constantly on the strain to produce novel designs. "The passion for such oddities," said a prominent jeweler, "will not probably outrun the season, but it will last long enough to exhaust the fancy of our native designers, to say nothing of our stock."

The one gem (besides rubies, sapphires, diamonds, and emeralds) that holds its place this season as a real jewel, independent of design, is the cat's-eye, which is set open, and cannot be cut in facets or in table form after the Indian style, without wrecking its beauty. It comes from Ceylon, the island of gems, and the popular name by which it is known, arises from two peculiarities that give it a singular resemblance to the eye of the cat. Its best color is the light yellow of new honey, although some prefer the darker, half-sapphire hue which is equally common. Across the surface lies a streak of whitish light, narrow and disposed in rays, but as well defined as the pupil of the cat's eye. The resemblance is less striking in the darker colored corundum than in specimens having the pure honey tint, but it is sufficiently so in all cases to suggest and justify the name that the gem has acquired.

Another gem, also from Ceylon, which disputes popularity with the cat's eye, and is a positive novelty this season, is the Alexandrite. The stone is so new to jewelers that the poets of the art have not had time to compose a legend as to its origin, and a precious stone without a romantic story in regard to its discovery, is an anomaly in the literature of minerals. In color it has the brilliant red of the ruby, but rather deeper, its luster having a violet tinge that causes the general effect to approximate to purple. It is not likely that many will appear in the ball room or at evening receptions this winter, as

the number to be had is very limited, and the price well-nigh fabulous. Set as the center of a pendant, with a border of diamonds, upon a skeleton of gold so slight in its structure that the gems appear to form a cluster of their own attraction, few more brilliant appendages to a diamond necklace can be imagined. In form the stone resembles the cat's-eye, possessing the same bold convexity, with a more brilliant light—a light, indeed, scarcely excelled by that of the ruby itself. The lady who is so fortunate as to possess an Alexandrite ruby this winter will be the envy of her admiring friends, and possibly the destruction of her husband's balance at the bank.

There is a passion for necklaces this season, either of rare workmanship in gold or old Egyptian, Indian, and mediæval patterns, or composed altogether of the most expensive stones, with the framework scarcely visible. The designs, even when gems form the materials, are often strange and grotesque, and sometimes a trifle revolting. In one of Tiffany's cases lay coiled, upon a ground of purple velvet, a serpent as thick as one's finger, composed of more than 1,500 diamonds set in lines so as to carry out the serpentine illusion, with the tail turned and looped over the slender neck. In the reptile's forehead was set a solitary emerald of the largest size, and each eye was a small but brilliant ruby. The drooping head formed the pendant, the emerald being the center of that ornament. A necklace of old Egyptian pattern, with scarabæa formed of diamonds set upon the gold skeletons of as many beetles, is a design more fashionable perhaps than the diamond serpent, but by no means so striking.

The gems that are fashionable for bracelets this season are rubies, emeralds, cat's-eyes, sapphires and diamonds. The latter probably comes last, the colored stones having the preference. The fancy is for a single large gem, either set *solitaire* or flanked by two smaller ones. But the two gems, one for each bracelet, though of equal value, must not be of the same kind. If diamonds are employed, the stones must differ in color, one pure, old mine white, the other Brazilian yellow or black. A ruby and a sapphire or an emerald and a ruby, each large and full of luster, may pass with a votary of fashion as in correct taste; so may a white pearl mated with one of inky blackness. But on no account must the two stones be exact counterparts of each other.

With large gems, the broad gold band that has been popular so long as a circlet for the wrist has been discarded, and the knife-blade setting, which combines the effect of merely a thread of gold with the strength of a band, has been adopted. For pins for a lady's scarf the fancy of the designer runs riot, but diamonds, sapphires, emeralds, and rubies are, as in lace-pins, the only gems that are admissible, without cameo or intaglio designs. A handful of diamond daisies, a feather composed of yellow diamonds, an owl's head of diamonds with two rubies for eyes, a spray of diamond pansies with ruby or sapphire centers—these are examples of the trinkets affected by the latest freak of fashion. One of the quaintest things of this kind yet seen is a diamond dragon-fly, rather longer, perhaps, than the index finger, the main portion of the head consisting of one large gem, table cut, the proboscis of smaller ones, diminishing in size almost to a diamond point, the body of a series of large jewels diminishing in size by well-nigh insensible gradations, the extended wings composed of gems so minute as to seem like a brilliant dust, tipped at the ends with sapphires, and the antennæ and other delicate processes suggesting mere threads, over which diamond powder has been sifted. Bows of diamonds, with not a vestige of gold visible by ordinary inspection, and cameos and intaglios cut in aqua marine and in other minor stones, finish a list as long as Homer's catalogue of ships, and decidedly more interesting to ladies of fashion. A gold elephant with trappings of diamonds, and a diamond elephant with caparison of rubies, as though harnessed for a journey, will serve for final examples of the extravagant conceits in which the fancy of fashion revels this winter. Scores of such things are seen in drawing rooms and at fashionable weddings. Sober, elderly ladies have black onyx, studded with diamonds, for lace-pins or scarf-pins.

Great as the fancy this season is for cameos and intaglios, it is exceeded by the passion for enamel, and the Limoges is perhaps the

most popular variety. A necklace of this material, upon which the portraits of all the Turkish officials of State have been painted from photographs, and then preserved forever in enamel, is one of the rarest things in Tiffany's case. Gold match-boxes studded with diamonds, smelling bottles with a large cat's-eye set in the stopper, and Egyptian idols cut in amethyst are among the trinkets that are most eagerly caught up for presents.

The fashionable tourmaline is seen in many varieties; a pair of pink tourmalines weigh twelve karats, and possess all the dazzling brilliancy of diamonds; the green and blue varieties are found in Brazil, and are sometimes called the Brazilian emerald and sapphire; the green is of a rich olive shade. From the East comes the spinel ruby, an exquisite red having a purplish or lake color, and exceedingly brilliant; it rather partakes of the color of the garnet, possessing greater depth of tone. The violet spinel also bears the name of the almandine ruby; and the balas ruby is a spinel of rose pink. Other spinels and tourmalines flash out in emerald flame or in the intense blue of the sky and deeper sapphire tints. The power of these valuable crystals of tourmaline is so great in polarizing light that, cut in slices, it is used in the polariscope for analyzing the properties of other minerals. A Greek cross square in shape has three magnificent sapphires set across; on the upper point is set a ruby; on the lower a red, very brilliant tourmaline; the delicately engraved work of the cross is studded with diamonds. Among the foreign strangers is admitted the American emerald of North Carolina, called the Hiddenite, after the discoverer; it possesses great brilliancy, and is of a light grass green color. Among some superb pendants is a cross formed of four crescents set with diamonds and a ruby. A square cross pendant of a fanciful shape is set with a black pearl. The six-pointed star of India has a pearl in the center, of marvelous luster; this is set with diamonds. A ten-pointed star of diamonds has an emerald in the center, of the deepest, richest color and purity. Lace pins are wrought in the most delicate and fantastic diapered work, in which the shimmer of gems and gold are brought into exquisite harmony; in one of these is set a center stone, an intense pink tourmaline, between two large diamonds, and a pearl at each end; these stones seem to be suspended in the air, from being set in the invisible knife-blade setting. In another a large sapphire gleams from a framework of diamonds.

Among pendants is a magnificent specimen, consisting of a cluster of large diamonds. A pearl in the center, of perfect shape and purity, weighs fifty grains. From this is suspended another large diamond and equally large pear-shaped pearl. The center pearl is surrounded by small diamonds. A marvelous necklace is composed of three strings of large pearls, each a perfect prototype of the other, round in shape, pure white, slightly transparent and possessing the peculiar luster characteristic of the gem. It is fastened with a diamond clasp. Glove bracelets are models of artistic skill and elaboration. In one specimen there are three, the edges of each one cut in points; each point is set with either a ruby, diamond or sapphire. These may be worn separately, or placed together, each point fitting into the space between the other points and forming one bracelet of glittering Oriental beauty. Another is set with an enormous white and black pearl and diamonds. Others are hinged, set with gems, and two of these united form a charming collar. Other styles are made in a crossover fashion, set with white and pink pearls, diamonds, and other gems, in straight, waving, and diagonal lines. Scarf pins for gentlemen are exceedingly unique. A dancing bear, having a very expressive face is carved out of jade; one paw is laid on the heart, from the other drops a diamond. From a piece of petrified palm, gray with natural brown spots, is carved a tiger's head. An owl is cut of garnet, with diamond eyes; and from a ruby tourmaline, with peculiar shifting sunset tints, is cut an antique masque, with diamond eyes, and a gem in the mouth. From a South African cat's-eye is carved a monkey's head, with diamond eyes. A peculiarly beautiful stone, the sunstone, which is opaque, with changing light, is carved into a curious copy of an antique masque, rose dia-

monds in eyes and mouth. A heart-shaped green peridot is carved in intaglio, showing the head of Medusa; the setting is a coiled serpent. From brown onyx is exquisitely carved a profile head of a Bedouin chief, set in enameled silver of striped turban and collar.

There are also numerous novelties in scarf pins, many of which are very valuable. An owl's head made of Labrador sapphire, with diamond eyes, is very odd, and another new thing is the opal quartz in heads and various other shapes. Hammered gold serpents forming a capital letter are also new, and a gentleman may wear his initial on his scarf if he so pleases. Another odd fashion is a half dozen pins, three silver and three gold, crossing each other and mounted on a long pin to wear on the scarf. Something very new are fresh-water pearls in their natural shape, forming heads of animals, fishes, etc. These are not very expensive, yet it is impossible to duplicate them. Among these curiosities is a head and bust the exact likeness of Michael Angelo. It appears almost incredible that such a thing can form of itself, but it is true, and is now mounted on a gold pin to be worn on the scarf. Plaques of all kinds are still fashionable, and cats, rabbits, mice and birds are all prettily enameled to appear as natural as possible. A little gold basket has a kitten peeping out from under the cover; a gold pipe has a mouse running over the stem; a mouse is jumping out of a frying pan, a monkey grinding an organ, a rabbit in full dress, a mouse in a school bag, a frog skating and a monkey shaving himself; all these and many more oddities are produced "as natural as life" and in the most unique settings. A bunch of forget-me-nots in gold, with blue enamel, forms a very pretty scarf pin.

In gold and silver plate and bric-a-brac again are seen the ingenious handwork, the increasing tendency toward all things Oriental, Japanese, Indian and other designs. The Celtic hammered, filigree, chasing, engraving and repousse work show the marvelous fidelity in ability of reproduction of American workmen. Copper predominates, and is very fashionable; in hammered designs the colors are dark warm reds of finest polish, mellowing into yellowish browns, scales and shadings like shapeless lichens wine-tinted. This is seen in beautiful glass standard lamps; some have silver decorations applied. Some tea-caddies of this metal are hammered, the colors as described above, barred with thin silver cords, a lizard on the lid. Some exquisite small pieces show a pot for black after-dinner coffee of silver in purest Persian shape; a wreath of leaves and berries rises from the base on one side; the other shows water and the figure of a man and birds. This is in copper applied. On the sugar-bowl is a branch, leaves, a huge spider, and an owl of copper. The little square tray, in warmest red tints, has the highest polish. The reverse of this is a tea-caddy of silver in satin finish, hammered surface, over which trails a branch of cherries and foliage in dark copper; a snail decorates the lid. A similar caddy oxidized has copper decoration of strawberry vines. A magnificent silver punch-bowl defies pen description. The base is copper, wrought into a branch of a pear tree gnarled and twisted. Another branch, also of copper, droops gracefully from the edge of the brim over the outside with exquisitely carved and burnished leaves, and three natural-sized pears of golden green with a tint of red; one is slightly speckled. Over the other side of the bowl droops a bough of cherries, natural size, deepest red, one or two apparently worm-eaten, and in some of the dark-veined leaves, insects seem to have left signs of depredation. Among tobacco sets is a superb specimen of copper, with silver applied. In the cigar stand, the decoration is in silver, a strawberry vine drifting about the top, on the side is another vine and a grasshopper; this is on the ground of softest warm-hued shadings of rosy copper. The little cigar lamp for alcohol is hammered, a dragon forms the handle, the silver decoration is of water fowls and fish; the tray has the effect of water, a sand beach, shells, fish and birds in decoration of silver on the rich, dark red copper ground. Some cigarette cases are similar in workmanship.

A novelty is the incised work, as seen in a tea set. The satin-finished silver has ornamentation of gold and oxidized fruit and

flowers. The shape is round, square base, and fluted top. The curious handle represents the crooked branch of a tree, which passes half way around the base. A square-shaped tea set, with rounded corners, is incised, the entire decoration of closely set hawthorne flowers, flat and with curving leaves and fine gold stamens. A tea set of repousse, oxidized, is covered with flowers and foliage in high relief of "aboriginal" finish in the handles. A dinner set, square in shape, of fifteen pieces, is designed after the Elgin Marbles, the delicate satin-finished silver having on a base of mounted work of dead silver with yellow oxide of gold, figures of horsemen and chariots. Another beautiful set has exquisite decoration of wild roses worked out in repousse with unequalled fidelity to nature. A humorous tea set and tray is a unique representation of Japanese mythology. The grotesque, hideous god of storms urges on a hurricane, umbrellas fly through the air, a waiter loses his tray, a woman her wrap, and trees snap. These decorations are all in gold. Each piece has a different scene. The large tray represents water in silvery sheen and little wavelets, boats, trees in copper, and a landing place.

Some odd pieces show unsurpassed skill and beauty in the damascening and inlaying of various metals. A specimen in the shape of a fruit plate is worthy of being framed as a plaque. In the foreground there is a bit of woodland, furze, bushes, wild roses and brambles; half hidden in these is a large brown thrush on her nest; a thornbush rises beyond; on it is perched the male thrush, his open bill showing lavish carolling beneath the softened glimmer of pearly color, a mixture of gray, blue and opal in the sky; still beyond gleam brown fallows, gray patches and trees of bronzed green. These tints are in alloys, and the black lines engraved are like the finest etching. Some flower vases show marvelously executed decoration by hand. A large rose of tinted gold rises from a mass of feathery furs in brilliant alloy tinting, and clings to a base of Persian design of silver and gold arabesques in bas relief. Even little gold and silver bells partake of the luxurious decoration. Wedding bells, for instance, show legends in gold letters on silver surfaces, such as, "She is My Own," "Kindle Never Dying Fires," etc. Some new individual peppers come in the shape and delicately tinted colors of an onion in silver. The stem holds the holes. Other shapes are red pepper pods, turnips, and a cucumber end. The newest gold individual butter plates show on their edges little pastoral scenes, a cow, a milkmaid, churns, pails, barnyard. Gold spoons are exquisitely decorated on the handles with fruit designs, each differing from the other, citron tinted, and tinted in natural colors. Some sets of knives of very fashionable designs, have hammered gold handles with silver and copper decorations. Superb sets of fruit knives with engraved silver blades, have bronze handles unlike. A large loving cup has an incised silver ground, branches of foliage covered in exquisite autumn tints; grapes and tendrils surround it in high relief. There are three rustic handles. Another loving cup of globular shape is a copy evidently of the "peg tankard" of the ancients, mirth provoking, and must needs be passed from hand to hand while a drop is left in the golden lining; the outside has a moonlike luster of satin silver and three unique square handles.

Diamond Plates and Powder.

BOTH diamond disc and powder are indispensable in every well-regulated workshop, and as both are easily prepared, I hereby give a description of the manner:

Owing to its extreme hardness, the diamond offers rare facilities to the jeweler and watchmaker to use it for all sorts of grinding operations; the real Simeon-pure, however, being too costly to be smashed up without more ado, its black brother, the carbonate, or bort, is used for this purpose; and it is to all intents as good, only it had the misfortune to be born black—of being simply a carbonate. It is reduced to splinters in a mortar made for the special purpose, consisting of a steel tube into which the pestle fits exactly, with only sufficient shake; it ends in a flat face, and is highly tempered. The tube is placed upon a thick, well-hardened steel plate, the diamond

is put in, the pestle is put upon it, and is struck vigorous blows until the diamond is splintered, while keeping the tube well upon the plate. Pieces suitable for gravers, drills, etc., are picked out, which are either riveted or soldered upon brass wires of suitable length.

Next make two grinding discs, to be used for first grinding of uncult stones, etc., as follows: Reduce the remaining diamond splinters as small as possible; have your discs made of brass; spread the diamond splinters apart upon a hard steel plate, lay the disc upon them and beat upon it until the splinters become firmly imbedded in it, and continue the operation until the disc is well filled with splinters. It is well to have two, one covered with coarser, the other with finer splinters.

Making Diamond Powder.—To prepare such powder for drilling, grinding and polishing of gems, use a mortar made of hardened steel. The bottom must be concave, and to have it as hard as possible, it is a separate part, tightly fitting into the tube, and screwed in, with raised bottom. The pestle also must be fitted in very exact, and its lower end correspond in shape with the bottom. It has a cover, which also is fitted in very exactly, with a hole for admitting the pestle, which must fit in almost air-tight. Within, between the cover and the pestle, leave a little space, to collect the dust arising from the pulverization of the diamond, and to lose nothing. Put about $\frac{1}{2}$ karat of finely splintered bort into the mortar, place it upon an anvil, and impart vertical strokes to the head of the pestle, turning it meanwhile. After having continued this labor for about ten minutes, take out the pestle, collect all the fugitive dust, put the pestle slowly upon it again, and continue the striking for another ten minutes. To be sure that the diamond is well reduced to powder, repeat the operation, and continue for another ten minutes; scrape off any adhering powder on the pestle, etc., with a knife; that from within the mortar with a piece of wire. The obtained dust is assorted into six numbers, from 0 to 5, by saturating it with oil. Put all the dust into a small porcelain vessel, of the shape of a watch glass, and fill it one-half with good olive oil. It is all stirred well together, left to settle one hour, and then, down to the sediment, poured into a vessel marked 1, and stirred again. After a lapse of two hours, it is poured except the sediments, into vessel 2; left in this for four hours, poured into vessel 3; left in this for eight hours, poured into vessel 4; left in this for sixteen hours, and the balance is finally poured into vessel 5. If entirely clear oil should separate afterward, it may be poured off. Should the hour be neglected by one or the other vessel, the contents must be stirred up again and left for its length of time. When the operation is ended, the little vessels are placed into a small box, agreeable to their number, and closed with a well-fitting cover.—HERMANN GROSCH.

A Wonderful Diamond.

FROM all accounts the wonderful Koh-i-noor, or "Mountain of Light," the property of Her Majesty, is eclipsed by a recently discovered diamond found in South Africa, and now in the possession of Mr. Porter-Rhodes, who is, I believe, the fortunate discoverer of the gem. The weight of the newly-found stone is 150 karats. It is uncult, but from its peculiarly favorable shape is not expected to lose more than ten karats during the process. The diamond is as big as a very large walnut, and is described as "like a halstone in sunlight, of a bewitching transparency and brilliant whiteness no other precious crystal can vie with." Most Cape diamonds are of an inferior yellowish tinge, which detracts from the value of the stones; but this specimen is not only the largest ever discovered, but of a purity unsurpassed by any of its compeers. I understand that the stone was recently shown to the Prince of Wales at Marlborough House, and that his best diamonds, when placed beside the Porter-Rhodes stone, were seen to be "off color."

Offers for his property flow in upon the lucky owner from all parts of Europe. The first offer received was £50,000; the last made, last week, was £100,000. The owner's bankers, I hear, are willing to advance £60,000 against the security. The stone will not, it is thought, change hands under £200,000, which is just £60,000 more than the famous Koh-i-noor is valued at. Mr. Porter-Rhodes asks the trifling sum of £300,000, or £1,500,000 for his property, and does not seem in any hurry to dispose of it. It is rumored that a Russian Prince is in treaty for the jewel.—Exchange.

Popular Gems.

ONE of the most popular gems worn this season is the Alexandrite, called after the Emperor of Russia. It is found in Takowaja, and as it contains the two chief military colors of the Russian empire, is highly esteemed by the people of that nation. It is transparent, but in consequence of its many flaws, crevices and rents, it is difficult to cut and polish.

A small amount of chrome oxide gives it its green color, which is much admired in daylight; and it contains just a trace of copper and oxide of lead, which makes it look dark-red by artificial light. By daylight these two colors intermingling, the green predominating. If the stone be turned towards the setting sun, or toward a flame, the red predominates. It is an extraordinary good specimen of trichroism.

THE CAT'S-EYE.

Much confusion exists concerning this very curious and valuable gem; a confusion arising partly from the ignorance of many in the trade as to its true nature, but principally from the mistakes of those who have written about it. In mineralogical treatises it is usually confounded with and described as a particular variety of quartz, which somewhat resembles it, but which is of little or no mercantile value, although it has occasionally been sent to Europe and this country by unscrupulous merchants as the true cat's-eye. The quartz specimens are found in Ceylon (also the home of the true cat's-eye,) in large quantities, and occurs chiefly of various shades of yellow and brown. It is semi-transparent, and when cut in a convex form, shows a more or less defined band of light with a *silky* luster, resulting from a reflection of the fibrous-like grain of the stone itself, or more properly from an intimate admixture of asbestos. This quartz cat's-eye, even when most perfect, cannot be compared in beauty with the real cat's-eye, for which it would not be mistaken, even by the uninitiated. It is at once distinguished by its inferior hardness and want of brilliancy.

The true cat's-eye is described as follows: In color it possesses various shades of yellow, brown and black, rarely black. Rays iridescent, and is susceptible of a high polish; hardness, 8.5; specific gravity, 3.8; infusible and not affected by acids. Its chemical compound is 80 alumina, 20 glucina; coloring matter, prot-oxide of iron. The quartz specimen is seen only in two shades of color, brown and yellow. Its rays and polish are dull; hardness, 6 to 6.5; specific gravity, 2.63; melts with soda to a clear glass; soluble in fluorine acid. Its chemical composition is 48 silicium, 51 oxygen, with a small amount of oxide of iron and lime.

The true cat's-eye is a rare variety of the chrysoberyl, of extreme hardness, and is characterized by possessing a remarkable play of light in a certain direction, resulting, it is supposed, from a peculiarity in its crystallization. This ray of light, or "line," as it is properly termed by jewelers, shines in fine and well-polished specimens with a phosphorescent luster. The cat's-eye comes principally from Ceylon, where it is found with sapphires, and is met with of various colors, ranging from pale straw color throughout all shades of brown, and from a very pale apple green to the deepest olive.

Some specimens much sought after in this market are almost black. The line, however, no matter what ground color the stone may possess, is always white, and more or less iridescent.

This gem is valued principally according to the perfection and brilliancy of the line, which should be well defined, not very broad, and should run even from end to end across the middle of the stone. The color does not influence the value much, some jewelers preferring one tint, some another. On the whole, perhaps, the most popular colors are the clear apple-green and dark olive; both of these form a splendid background, and contrast well with the line. A rare specimen of this gem was recently imported by Messrs. M. Fox & Co., of this city, and was sold to the trade for \$1,500.

BLACK OPAL.

This stone was introduced in the English market some five or six years ago, and, like everything else that is new and uncommon,

was immediately sought after by the jewelers. It commands a high price—about 50 per cent. higher than the ordinary opal. The colors in this are certainly very lovely, yet how they acquire their blackness and deep tints is questionable. It is suspected that some other hand than unassisted Nature may have been at work.

Several fine specimens lately appeared in this country, and have passed into the hands of the gem collectors. At present these stones are rare.

THE SAPPHIRE.

No precious stone is more interesting than this. It is known to almost all nations by the one name, sapphire. It is a corundum, and is found most frequently in secondary deposits, loose in sand, or in debris, with other precious stones. Its specific gravity is 3.9 to 4.2. In color it is a beautiful blue, like that of the blossom of the little weed called the "corn flower," and the more velvety its appearance, the greater the value of the stone. The Oriental sapphire retains its exquisite color by gas light, while that of the less valuable specimens becomes black, or like to an amethyst in color. In consequence of its hardness, its beautiful color, and its bright, vivid luster, it is one of the most prized as well as one of the most fashionable gems worn. Sapphires were originally obtained from Arabia and Persia; but now the finest stones are imported from the kingdom of Burmah. Ceylon sapphires are not rare; they are found in the debris of the mountains. Several fine specimens have been found in Newton, N. J., but they are very deficient in color; they are also found in many parts of Europe. The value of these stones is very much determined by special circumstances, and like the diamond, its color, purity and size are taken into consideration, when estimating the commercial value. The Oriental sapphire is the most highly prized. The imperfections which appear at times in the sapphire, and which lessen its value, are clouds, milky, half-opaque spots, white glassy stripes, rents, knots, a congregating of colors at one spot, and silk-looking flakes on the table of the stone. These gems are now successfully imitated, and not only are other stones of like order sold for the sapphire, but even glass, technically called flux, and a variety of doublets are passed off not infrequently for sapphires.

They may be distinguished from the genuine stone partly by their color, but more especially by a careful examination of the girdle, when, should the sapphire have been joined to an inferior stone, the attempted deception will be detected.

On the Use of Spectacles.

NO MORE mischievous mistake can well be made than the one which is involved in the prevalent idea that the use of spectacles should be put off as long as possible. This becomes evident at a glance as soon as it is understood that the case is one of incapacity of the lens of the eye to adapt itself to near vision in consequence of loss of accommodating power. The continued effort of the delicate mechanism of the eye to accomplish a task which is beyond the measure of its capacity, must necessarily be attended with an injurious, as well as a painful strain. Squinting is one of the evil consequences which are apt to ensue if such fruitless efforts are long persevered in. Mr. Carter remarks upon this point in the following monitory strain: "The effect of accommodation is precisely that of adding a convex lens to the passive eye, and so, when accommodation fails, we can supply its place by adding the required lens by art. To do this is the ordinary function of the spectacles which are required by all people, if their eyes were originally natural, as time rolls on. The principles on which such spectacles should be selected is that they should be strong enough to be effectual, and they should be used as soon as they are required. Opticians often supply glasses which are too weak to accomplish what is needed, and which leave the eyes still struggling with an infirmity from which they ought to be entirely relieved, while the public frequently endeavor to postpone what they look upon as an evil day, and do not obtain the help of glasses until they have striven hard and fruitlessly to do without them. These

are important practical errors. It cannot be too generally understood that spectacles, instead of being a nuisance, or an incumbrance, or an evidence of bad sight are to the far-sighted a luxury beyond description, clearing outlines which were beginning to be shadowy, brightening colors which were beginning to fade, intensifying the light reflected from objects by permitting them to be brought closer to the eyes, and instantly restoring near vision to a point from which, for ten or a dozen years previously, it had been slowly and imperceptibly, but steadily declining. This return to juvenility of sight is one of the most agreeable experiences of middle age, and the proper principle, therefore, is to recognize loss of near sight early, and to give optical help liberally, usually commencing with lenses of +1.25 or +1.50, so as to render the muscles of accommodation not only able to perform their tasks, but able to perform them easily. When, as will happen after a while, in consequence of the steady decline of accommodation, yet more power is required, the glasses may be strengthened by from half a dioptic to a dioptic at a time, and the stronger glasses should at first be taken into use only by artificial light, the original pair, as long as they are found sufficient for this purpose, being still worn in the day-time." The common prejudice against using spectacles as soon as the impairment of the sight begins to be observed with advancing age, appears to have unfortunately arisen from the fact that there is a serious disorder of the eye, known as glaucoma, which is attended with obscure vision, resembling that of old sight, but which is nevertheless altogether different in its essential condition. The mischief in glaucoma usually proceeds with an accelerated pace. Stronger and stronger glasses are used on account of the assistance which each fresh accession of strength at first gives. But the sufferer in the end becomes hopelessly blind, and the result is then erroneously attributed to the influence of the glasses which have been employed, although as a matter of fact this has had nothing whatever to do with the issue of the case. The injury to the sight in such instances is really due to an over-tense state of the eyeball having been set up, and to the destruction, in consequence of abnormal pressure, of the delicate nerve-structures within. Mr. Carter unhesitatingly affirms that the habitual use of strong magnifying glasses is not injurious to ordinary eyes, and he supports his opinion in this particular by referring to the circumstance that watchmakers, who commonly employ magnifying glasses in their work, in reality enjoy a very enviable immunity from diseases of the eye. It appears that it is quite an unusual thing to find a working watchmaker among the patients of an ophthalmic hospital. Mr. Carter holds that the habitual exercise of the eye upon fine work, such as these men are engaged in, tends to the development and preservation of the powers of vision, rather than to their injury.—*Edinburgh Review*.

Swiss Laws Regulating Hall Marking.

[From the *Journ. Suisse d'Horl.*]

ARTICLE 1. The stamps for the control of the different standards shall be as follows:

GOLD.

18 karats, or $\frac{18}{1000}$ and more;



$\frac{18}{1000}$ and more;



SILVER.

14 karats, or $\frac{14}{1000}$.



$\frac{14}{1000}$.



ART. 2. Wares sent to the Bureau of Control to be tested and stamped, must be classified and separated according to standard.

Each class to be accompanied by a declaration signed by the producer, stating the number and nature of the articles, their standards and quantity.

Articles of bijoutry and goldsmithing, watch cases, and all pieces not bearing number, must, to be stamped, bear the mark of the manufacturer, or some other distinguishing feature known at the bureau.

ART. 3. Gold or silver were presented for stamping, will be tested in all its parts. To prevent a falsification subsequent to the test, they shall be presented entirely mounted; not finished, but sufficiently advanced in their fabrication that in finishing, neither the indented stamps nor the different parts of the wares may be tampered with or falsified.

ART. 4. None of the parts composing a piece of work of gold or silver, shall be of a standard inferior to that of the body of the work, irrespective of the color of the alloy employed in its fabrication or decoration. From this provision are excepted the *appliques* and ornaments of platinum or silver placed on the exterior; also the hinges of silver watch cases, governed, however, by the provisions of Art. 8.

ART. 5. The stamp will be placed upon all parts essential to the work, to wit:

1. On watch cases; upon the bottom, the dust cap, the rim and the stem. On the demand of the manufacturer, the stamp may also be applied to the ring.

Stamps bearing the same device as represented above, but smaller, shall be placed upon articles of bijoutry, goldsmithing, rims, stems, etc. If the dust cap is of any other metal than the rest of the case, it shall state in letters upon it, its composition.

2. For goldsmithing and bijoutry, the stamp will be applied upon the body of the piece. The application to be made upon such parts most convenient and solid to receive such stamp.

ART. 6. If the gold or silver were should contain exteriorly or interiorly parts of an inferior standard from that announced in the declaration or factory stamp, such parts shall be cut by the sworn assayer, in presence of a member of the administration, without prejudice to any of the penalties provided by law.

ART. 7. All gold or silver were containing interiorly parts of an inferior standard, an excess of solder, of metals, alloys, or substances foreign to those of which the work is composed, shall be deemed "filled;" and such articles, proven to be filled, shall be cut by the sworn assayer, in presence of a member of the administration, without prejudice to any of the penalties provided by law.

ART. 8. When wares submitted to stamping are destined for a country whose laws demand full or slightly superior standards than those fixed by the Federal laws, or one which does not admit of the exceptions provided by Art. 4, it is made the duty of the producer to comply with those existing laws, and adopt the necessary precautions. The Swiss Bureau of Control does not assume any responsibility after having affixed the Federal stamp, and when its legal requirements and exceptions of Art. 4 have been complied with, whether the wares in question are subsequently ruined or refused by a foreign bureau of control.

ART. 9. The tariff for stamping shall be as follows: *a.* For a gold watch case with glass, 15 frs.; *b.* For do. hunting case, 20 frs.; do. do. silver watch case, with glass, 5 frs.; do. do. hunting case, 10 frs.

For bijoutry: *c.* For a piece of less than 10 grams, 5 frs.; do. do. 10 grams and more, 15 frs.

For goldsmithing: *g.* For a piece less than 150 grams, 5 frs.; 150 and less than 300 grams, 15 frs.; 300 grams and more, 50 frs.

These fees shall be strictly adhered to; however, the Federal Council may authorize a slight increase by bureaux which do not earn sufficient to cover their annual expenses.

The return of the wares to be at the cost of the producer.

For articles presented at the bureau, which cannot be stamped, the assaying fees shall be double.

ART. 10. Each stamp will bear a particular distinguishing mark, that it may be known from what bureau it emanated.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Ninety-first Discussion.—Communicated by the Secretary.

[NOTE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. Write only on one side of the paper, state the points briefly, mail as early as possible, as it must be received here not later than the eighth day of the month, in order to be discussed and reported in the CIRCULAR for the next month.

REPAIRING CENTER PINION—HOW TO SET A RUBY PIN.

Secretary of Horological Club:

I have a P. S. B. movement that has been running too long without being cleaned and oiled, and the lower pivot to the center pinion is cut badly. If I turn it down and repolish, and fit it to its hole again, will it interfere with the time of the movement? Or will it have to have a stronger spring to make it keep up to the correct time? And will some of your honorable body please inform me of the best way to set a roller jewel? Is the roller to be removed, and how to heat it? Please give full particulars and oblige,

P. C. T.

Mr. McFuzee replied that when the center cutter pinion was repaired and repolished, the hole should be either bushed or carefully closed to fit the pivot. If the pivot was made smaller, and the hole left as it was before, it might not affect the time, but would probably cause stoppage, either by the pivot being loose in its hole and pushed away from the wheel, thereby making the gearing too shallow and causing the teeth to catch on the pinion leaves—or by causing the pinion to be forced out of upright, and the center wheel to tip up on one side and rub somewhere. This latter fault was also likely to cause trouble in the dial wheels. The best ways for bushing or closing center wheel holes have been given in detail in back numbers of THE CIRCULAR, especially in the Practical Hints articles. One or the other should always be done, if the center pivot is reduced to any noticeable extent.

As regards setting roller jewels, he presumed that Mr. T. meant the ruby pin in the table rollers of lever watches. If the jewel is simply jarred loose, it is not necessary to remove the roller, but heat, sufficient to melt the cement, can be conveyed to it by a wire heater, of which several kinds have been described in these Proceedings during the past year or two. One was explained by Mr. Regulator at our last meeting. The most common form is a sort of spring clamp of copper wire, say $\frac{1}{8}$ inch in diameter. First take a turn in the center, then bend the two ends nearly parallel, making the tool about an inch in length. Cut a slight groove on the inside of each end or claw, deep and wide enough to fit over the edge of the roller, with a graver or otherwise, then bend these claws so that they will spring together and clasp the roller between them. The outer bend is then outside of the balance rim, and can be heated by the lamp without even warming the balance—and the heat travels along the wires to the roller, warms that, and softens the cement, allowing the ruby pin to be adjusted in position, when the clamp is pulled off and the roller and cement cool down. The clamp is usually put on from the back side, away from the ruby pin, and held in the tweezers so as neither to touch the balance rim nor the hair-spring. If the ruby pin is not only loose but the hole is full of oil and dirt, the hole and jewel should first be cleaned to free them from grease, after which fresh cement is used for fastening the ruby pin. Good shellac is commonly used. In such cases it is generally better to remove the roller from the staff. Watchmakers would save themselves a good deal of trouble and blame from customers by remembering that alcohol must not be employed for cleaning the balance or the lever, as it will dissolve the cement and cause the jewels to come loose, making no end of needless bother and work. And the workman should remember that he has no right to take pay for such work, for it is the result of his own unworkmanlike course, and it would be as much out of order to charge for making good such faults of his own as to break jewels and charge for new ones. These last remarks are not designed for Mr. T., but as a caution to all who may read our Proceedings.

REMOVING STONES FROM CLOSED SETTINGS.

Secretary of Horological Club:

I receive THE CIRCULAR every month regular through the American News Co. Having become very much interested in the 'Proceedings of the Club,' I come to you for a little information. Can you tell me a safe and easy way of extracting stones from closed settings? I have had considerable bother with that class of work, and am anxious to get some method to take the stone out properly. I must give my word of praise to THE CIRCULAR, and can say it is the best book for watchmakers and jewelers that I have ever seen.

I remain,

L. E. D.

Mr. Rolliver responded, if the stones are real, you can very often pull them out with a wax stick, made of beeswax and lamp black, or a cement stick, made of pitch and brick dust. The wax stick is used cold. Clean the stone by wiping, then press the wax upon it gently till you have about covered the surface, then give a smart pull. If the stone will not then come out, warm it, and apply the cement; when it is cold, pull smartly. If this does not get the stone out after trying two or three times, you will have to cut the gold away from a graver or spitstick; then it can be easily pulled out with the wax stick.

SCHWERTER'S JEWEL-SETTING OPENER.

Mr. Uhrmacher then called attention to the above named tool for opening the setting for replacing broken jewels in watches, which he considered the best he had seen for the purpose. He regarded the stiffness of the jaws as very desirable to secure the perfect roundness of the setting, instead of yielding and springing, as some kinds of openers did, when they came to an obstruction. By using this tool according to the printed directions given with every tool, even an inexperienced workman could neatly and quickly raise the bezel, ready for the reception of another jewel. The convenience of such a tool is obvious, and he believed they were generally recognized as almost indispensable to a good workman's kit.

SCHOOL OF HOROLOGY—REDUCING BALANCE VIBRATIONS—SUBSCRIBERS FOR EXCELSIOR'S PRACTICAL HINTS ON WATCH REPAIRING.

Secretary of Horological Club:

I fully concur with the article on "Teaching the Art of Horology," and I think there would be no greater boon bestowed on the rising watchmakers than a horological school in some city. Some years ago I read an article on the school in Besançon, France, and at that time I wished I was able to go there and take my son with me, that he might be able to excel his father when quite a youth. I know that one cannot teach to another all there is in horology, but in such a school the young might be so taught that the practical watchmakers will not all die out. I wish earnestly some open-hearted, large-pursed men would bestir themselves and institute such a school. It would put quite a new phase on matters, and the public would know that they would be safe in putting their work into the hands of a graduate of the Horological School. 2d. I would state that I have no doubt that Mr. Isochronal fully understands the meaning of "turns," yet I cannot understand, if a turn means a revolution, how Excelsior could say that "Arcs are reduced from a turn to three turns." Will Mr. I. excuse me, but I will ask him to be more explicit, so I may understand. 3d. Please enter my name as a subscriber to second series of Excelsior's Practical Hints on Watch Repairing, when it is published.

Yours,

E. V. D.

Mr. Isochronal agreed that a school for teaching both the theory and practice of horology was very desirable, but he thought the time had not come for it yet. Several efforts had been made, at different times and by different persons, to organize such a school, but the number of watchmakers who were willing to work for it, and to contribute towards the necessary expenses, was too small to accomplish anything. The great body of the trade want to stand back and look on, and wait for somebody else to do the work and pay the cost, while the outsiders criticize and dictate how things ought to be done, and

deliberate whether they will condescend even to patronize the institution, even for nothing. But when it is suggested that *they should pay something*, all their interest in the enterprise disappears at once.

Such an institution will not succeed until the need of it is not merely felt, but is pressing, and *must be met*. When the trade demands and will have it, and is ready to work for and contribute to it, then it will come, but not before. The proper way is for those who have the enterprise most at heart to organize a school themselves, and carry it on as well as they can with the means they can command. Get it in actual operation, so that it really accomplishes *something*, even if it be but little at first—then, if the trade avails itself of the opportunity and pays reasonably for the instructions given, the accommodations can be gradually extended, the plans enlarged, more teachers enlisted, and more branches taught as they were called for and support provided for them. This is the true and safe way to proceed. It is useless to provide schools till the trade wants them sufficiently to support them when provided. And when workmen want schools badly enough to be willing to support them, schools can easily be provided, in the way before stated. Let such a school be once started, and liberally patronized by students—let it be clear that it is needed and is accomplishing good work, and that the right men have hold of it, and plenty of money will be forthcoming for all its legitimate requirements. There is no lack of men in our trades who have both open hearts and large purses, and when they are satisfied that their money will be well applied, with a reasonable prospect of the institution being properly managed, practically successful, useful and permanent, they will contribute liberally towards it. The first and greatest need is that of competent men to take hold of the enterprise and work for it; give it their time, care, labor and thoughts, not for the sake of making money out of it, or getting a good, fair salary for themselves, but with an honest, self-sacrificing desire to do a good work for the trade. After competent and earnest workers and managers are secured, there will be no trouble in inducing moneyed men to aid with their means.

No one could doubt that such schools are sorely needed, and that they would be a real blessing to hundreds or even thousands of watchmakers, if conducted in the right way. But he could not agree with all the ideas advanced on the subject. One member has suggested this evening that classes in horology could be started in connection with the industrial or trade schools which have lately become so popular in this city, but he thought not, for the reason that our trade cannot be taught in a few lessons, like some others. It requires long, careful, and patient study and practice, extending over years of time. And while a short course of lessons might be sufficient, in the case of book-keeping, drawing, plumbing, wood carving, carpentering, painting, bricklaying, etc., it would be almost worthless for teaching watch repairing.

It should be remembered, also, that the horological schools in France, Switzerland and England are not designed for educating *watch repairers*, but for preparing workmen for *watch making*, i. e., for teaching them how to earn their living by making parts of watches for firms which manufacture watches. But there is no need for such schools in this country, because our watch companies do not operate in any such way. Instead of buying parts which are made by individual workmen scattered here, there and everywhere, working "on their own hook," after the custom abroad, our watch manufacturers employ their workmen and make their materials in their factories, under their direct supervision. There is consequently no such class of workmen to be educated in this country—and even if there was, the trade would feel under no obligation to educate workmen for the watch factories. It is evident, from this fact, that the situation is entirely different here. Schools were a necessity in those countries, because competition threatened to deprive the watch manufacturers of their trade, and they were compelled to educate their workmen for their own self preservation, as well as to keep their workmen from starving for want of employment. But here the need is for a far more extended and comprehensive training. We need schools not

merely for fitting men to make a certain kind of pieces, or even to do half a dozen different kinds of work, but for giving them that broad theoretical knowledge, and that wide and varied range of practical experience, which alone can make them competent to worthily fill the role of watch repairer. He (Mr. L.) feared that we should not soon see such schools in this country, and could only advise Mr. D. to give his son the best instructions he could, and then send him to work a year or two with some first class workman in a city, to "finish off."

2d. On looking at page 56 of Excelsior's book, he found that Excelsior did not say reduced from a turn to "three turns," but to "three-quarters of a turn." Hence, the error is with Mr. D., in not reading correctly.

3d. Mr. D.'s name is placed on the list of subscribers for the second series of Excelsior's Practical Hints on Watch Repairing, as requested. Also those of E. S. C., T. W., B. S. L., and several others who have sent in their orders since the last report. In reply to inquiries as to when it will be republished in book form, we are unable to give any information, as the articles have not yet been revised by Excelsior for that purpose. The first series of Practical Hints is for sale by D. H. Hopkins, Esq., at THE CIRCULAR office, at \$3.50, or sent post paid to purchasers. The title of the book is not Practical Hints, however, but "A Practical Treatise on the Balance Spring," a fact which has mystified a great many workmen who wanted "Practical Hints," but did not suppose this book was what they were in search of. As we have frequently stated, it contains the first series of Practical Hints, treating on making, fitting and regulating hairsprings, and the adjustment of watches and chronometers to isochronism, positions, heat and cold, and rating—thus including the most difficult and the finest work that the practical watchmaker is called upon to do. But notwithstanding the complex and often abstruse nature of the subjects treated, they are handled in that clear, practical and thorough manner for which Excelsior's articles have become famous, and any intelligent workman who will carefully read the explanations and directions in this book, will be able to understand the why and wherefore, and, with proper efforts, will be able to execute "fine work" himself. Even if he does not intend to attempt such jobs as "adjusting," he will be thought an ignoramus unless he at least knows what the terms mean, and is able to tell whether a watch called "adjusted" is really so or not. No one who makes any pretensions to understanding his business can afford to be ignorant on these subjects, and we know of no work in any language which is so well adapted for the comprehension and guidance of the practical workman in informing himself on these points.

The First Watch in the Jura Mountains.

A HORSE trader from Chaux-de-Fonds, in the Swiss Jura, which at that time counted but few houses, brought from the exterior country a watch home with him. The dwellers of these far-off regions very probably had never seen such a mechanism, but a young man lived there, who, besides the simple trade of his father, a blacksmith, had, from early childhood, evinced an unquenchable passion for all kinds of mechanical combinations requiring reflection. The watch got out of order, and was confided for repairs to this, at that time, fifteen-year old boy, Daniel Jean Richard Bressel. He took it down, found the defect, and put it together again. He had meanwhile studied the entire mechanical arrangement, made a drawing of each part, and went to work to make a new one, for which purpose his inventive genius was forced to supply the lacking tools. Suffice it to say that in one and a half years he had manufactured the first watch in the Jura. When Bressel died at Locle in 1741, a lucrative business already had taken seat in this poor pastoral region, which, little by little, has become such an eminent source of wealth to the entire country.

"And when dying leave behind us
Footprints on the sands of time."

Gold and Silver Plating by Contact.

GILDING and silvering by the galvanic method consists of two processes. One, in which a galvanic current (a product of different galvanic elements) is conducted into the bath containing gold or silver in solution, and by which a deposit of these noble metals contained in the bath is effected; the other, by effecting such a deposit by the elements within the bath (zinc). Different apparatus have been constructed for this purpose, and I hold that the immediate contact of the zinc with the article to be treated is the most simple and efficacious for the ordinary wants of daily life. The bath in its composition need only be simple and appropriate; gilding and silvering for the common wants of the industrial pursuits should both be economical and simple; no great scientific knowledge must be necessary; wherefore galvanic gilding or silvering with immediate touching the zinc, the so-called contact gilding, is best adapted for the common, small places of business, where it is carried on, on account of its simplicity and durability.

Yet another method is sometimes used—a simple immersion of the article in a gold or silver containing fluid; this, however, is not galvanic gilding; beside it has little claims on beauty, none whatever on durability.

The first and chief requisite by galvanic precipitation of any sort is utter cleanliness. It is the first and last condition for success; without it, all your endeavors will be fruitless, or mediocre. We often hear complaints about unattractive and indifferent gilding, and this may be traced directly to a want of cleanliness, occurring both in the preparation and manipulation of the gold or silver bath, as well as in the subsequent operation of precipitating the metal upon the article.

There is a great variety of recipes for preparing galvanic baths containing gold or silver; but my experience teaches that the most simple is generally the best. This holds equally good with regard to durability as well as beauty. I have used and experimented with many different compositions, and have uniformly found the following to be the most simple and the best, and I may in every respect recommend it, being satisfied that the galvanizer who has once mastered the few simple instructions necessary, will not abandon it for any other method. Any composition of numerous chemicals is always subject to accidents and mistakes, and work performed by their assistance is apt to be faulty.

RECIPES.

Dissolve $3\frac{1}{2}$ grams fine gold, which has been rolled or beaten as thin as possible, and finally red heated and cut into small pieces, in about 15 grams nitro-muriatic acid. Should it be evaporated without entirely having dissolved the gold, add another small quantity until a thorough solution is effected. Do not take too much, however, not to delay the subsequent driving off. The gold being sufficiently dissolved, let it boil down to a red, syrup-like mass, at which point remove it at once from the fire, to prevent a farther drying. This dissolving is best performed in a porcelain vessel, at a moderate heat. The acid must gently boil. The gold, thus dissolved, is saturated with some clean rain or distilled water. In another porcelain or glass vessel dissolve 90 or 100 grams cyanide of potash, in about one liter clean rain or distilled water. Both the solutions of the gold and cyanide are simultaneously poured into a well-enamelled, cast-iron pot, which contains about one liter clean rain or distilled water; place it upon a coal fire and heat it to boiling, but do not let it boil. As soon as the first symptoms of ebullition appear, remove and let it cool. The fluid may be used at once; it is better, however, to let it stand over night to settle. Decant carefully next morning, down to the sediment, and it is ready for gilding. When rightly used, it produces an admirable high yellow color, playing into red, also a handsome mat, accounted the *ne plus ultra* of all gilding. By increasing the cyanide 10 to 20 grams, the color becomes still more red; both the color as well as the mat, possess a remarkable fire.

SILVERING.

The same manipulation holds good for preparing the silver bath.

To 15 grams dissolved silver take 90 or 100 grams cyanide of potash, and do as specified for gilding; by this, however, it is unconditionally necessary to let the fluid stand over night. In urgent cases, it may be used after cooling, but the color will be found not as white, or the mat as clear. Both the gilding and silvering fluids are enhanced in their effects by being stored in well-corked bottles—their tone and color are most decidedly improved thereby. I do not dissolve any fine silver, of late, but use the cheaper article, nitrate of silver, found in commerce. It may be used without further preparations by simply saturating it with water; if desired, it may be precipitated with salt. I recur to my prefatory remark about cleanliness; that in the preparation, clean vessels, clean water and clean hands are unconditionally necessary. The gilding as well as the silvering, if well prepared, are clear, transparent fluids, with a tinge of yellow. It may occur that, when wanted, no rain water can be had, and distilled water is rather high-priced. In such a case, condensed water from a steam engine will answer.

The gilding, as well as the silvering, is performed in the same manner. When the article has been well prepared, it is put into contact with zinc (a thin strip). A single touch with it is enough, as long as the gold or silver bath is strong, and it generates a sufficient current for gilding or silvering even a large article, handsomely and quick. Larger articles are sometimes wrapped with one or several narrow, thin strips of zinc. Smaller ones are strung, as many as convenient, together on one strip. Small weighty articles, if they cannot be strung on a strip, are simply immersed in the gold or silver bath, and connected by a few strips. The withdrawing of such articles is done by decanting the liquid into another vessel, holding something against the former to keep the articles from tumbling out.

When using, both the silver as well as the gold bath are heated up to boiling; they will commence to act from the time of becoming warm. The greater heat produces more firmness of the deposit, which at the same time is accelerated. The fluids must never actually boil, however. All articles immersed in them should never remain in a state of rest, but should be constantly agitated. The noble metals precipitate more uniformly, quick, and assume a purer, clearer color. A state of rest, however, produces no actual defective coating.

The gold and silver baths in the above specified compositions are too strong, and must be reduced with almost an equal bulk of water. To hit the medium must be learned by the experimenting operator. Different articles require different strengths of baths. When diluting with rain water, either the fluid should be heated to boiling, or the water added in a boiling state.

It is well, soon after the first immersion of the article, and when only thinly covered, to take it out and brush it well with cream of tartar. This prevents an unequal massing of the gold or silver in one place; it does not occur with articles which have been treated with scrupulous cleanliness, and subsequently glow-heated; but those which have simply been brushed with sand and water, and rinsed, are once in a while liable to such an occurrence, that the metallic deposit will collect in one spot, or peel off. A vigorous brushing, as indicated, will also contribute to render the deposit more tenacious. When the first brushing of cream of tartar has been performed, the article is returned and placed again into contact with the zinc. It may now remain until it receives a mat color. The coating by this time has become pretty heavy, but if more is desired, it must be brushed again, and re-immersed. This operation is repeated as often as needed, and the coating is becoming sufficiently heavy. While the bath is strong and new, the coating deposited will be so thick in a short time that it may be polished with a steel without exposing the ground metal. Its durability is affected by a quick precipitation, which, however, is not as injurious as too small a percentage of cyanide in the fluid. The adhesiveness of the coating depends very largely from the quantity of the latter.

The dipping or immersion in the gold or silver containing bath is done as follows: After the article has been cleansed by heating or brushing with sand, it must be well brushed or scratch-brushed with

cream of tartar, and rinsed in good clean water. All vessels used for the purpose, as well as the water, must be scrupulously clean and free from any trace of grease or perspiration. Three vessels of clean water are used—one for rinsing, when the article is taken from the bath; one for receiving and brushing with cream of tartar; the third for receiving the article after brushing. The zinc strip, when the article is removed from the bath, must at once be taken off before it dries; it also must not be in connection with the article after rinsing the latter. It also must, after every use, be washed with a separate rag; after a successive use, it must be scoured with sand. The water in which the zinc is washed or scoured, as well as the zinc itself, must not come into contact with the water in which the article is laid or brushed. Cleanliness also asserts itself in this particular.

If a mat gold or silver color is desired, as is often the case, do not brush the article when finally removing it from the bath. Both the gilding and silvering, after a continued immersion of the article in the baths, prepared in accordance with the instructions given, will possess a fiery, lively dead. If a red gilding is wanted, add a small quantity of dissolved copper at the time of preparation. But I must say that I never found this latter color half as handsome as the former natural gold.

All articles destined to be gilt or silvered should be glow-heated and dipped. First, because the gilding or silvering will become more firm; and, secondly, the article may afterward be more easily and highly polished. This heating is not unconditionally necessary. Many articles are soldered with tin and cannot be treated thus, but the effect will be seen in the subsequent burnishing. If possible, at least heat them hissing hot, and immerse them in a pickle, or boil them in caustic potash, to remove all traces of grease, and pickle them.

I am satisfied that if the here indicated method is pursued, the galvanizer will always have his endeavors crowned with success; and should, peradventure, not everything turn out at first trial as anticipated, he should not throw everything overboard at once. A trifling accident or oversight may have occurred, which is not apt to happen again at the second essay. The intelligent workman will know himself where he erred, and endeavor to shun a repetition. In this, as well as everything else, "Experience makes the master."

GALVANIC FIRE GILDING AND SILVER PLATING.

It has often been said of galvanic gilding or silvering that, although handsome, it is not by any means as durable as when produced by fire. This is very true. Even heavy galvanic coatings of silver or gold, if much exposed to air or friction, wear far quicker, arising from the fact that such coatings by the galvanic method are not as close and compact as by fire. Experience has taught that galvanic gilding exposed to air, such as graveyard monuments, gilt lightning rods, crosses and buttons upon turrets, etc., turned black in a short time. If firm, durable, and heavy gilding and silvering is desired by the galvanic method, larger batteries or electric apparatus are requisite. Owing to the greater expenses, such large apparatus does not at all times stand at the command of the common workman, and even if it does, it cannot always be used to advantage. To increase the durability of my galvanic gilding for such articles where great firmness of the coating is required, I use the following methods, and uniformly obtain a gold and silver plating of great power of resistance:

To durably and firmly gild an article, add a trifle of mercury dissolved in nitric acid to the bath. Only use as much of the gold-containing fluid as is wanted for use. This changes the bath into one containing mercury as well as gold. When immersing the article into it, it will also coat with a thin mercury film, and give it a white appearance. When you consider the coating to be sufficiently heavy, withdraw the article, place it upon a good coal fire, and heat it sufficiently to drive off the mercury. This takes place very quickly, as the quicksilver film is very thin. When this is well evaporated, a uniform pale yellow, mat gilding becomes visible, such as occurs by fire gilding. This is scratched bright with a fine scratch-brush and

beer. If the coating is desired heavier, repeat the immersion, evaporation, and brushing. When driving off the quicksilver, leave the article long enough upon the fire, until it turns high yellow. After scratch-brushing, it is brushed with cream of tartar, and put into a clean gold bath without mercury, to give it the handsome gold color. A gilding obtained in this manner is, in durability and beauty, equal in all respects to fire gilding, not half as troublesome, and especially not injurious to the health. The mercury film is so trifling that its evaporation cannot be drawn into account. But this trifle is followed by effects greatly increasing the durability.

The same method is pursued by silvering, and the results are the same. A second method may be used by this for the production of a durable coating, specially adapted to smooth articles. When such an article has received a strong coating, heat it upon a coal fire, until it begins to turn yellow; in this condition take it from the fire, and burnish it with a burnishing steel dipped into oil. This burnishing must be a firm pressure, not to be done in a dry state, but with oil between the steel and the article. The polishing is heightened after cooling with Vienna lime. If the silvering is done with a separate battery, to precipitate heavy coats of silver, the article also must be "quicken," but it disappears during the immersion in the silver bath.

To designate the difference in the two methods, I have called it galvanic fire gilding and silvering. Attention must be paid in both instances that the mercury is completely driven off; also that the mercury containing both does not come in contact with the only gold containing one.

By these prescribed methods, a very durable air and friction resisting gilding and silvering can be produced, with the great advantage that the deposit may be controlled to become uniform and strong, joined to the greater ones, that such coating can be produced far cheaper than by fire, by which, even when manipulated by a very careful workman, a goodly quantity of metal is unavoidably lost, and it is far less injurious to the health.

Replacing Center Wheel Pivots.

TO REPLACE worn and broken pivots by new ones, is regarded by many watchmakers as an evidence of a botch. I am nevertheless bold enough to assert that a replacing of old or injured pivots often is very serviceable, and in particular cases to be recommended. The insertion of smaller pivots was already treated of in your journal, therefore I confine my remarks to those of larger dimensions—those of the center wheel. It will often have occurred to the repairer in country places that the upper center pivot was worn out or broken, and no new center pinion on hand. In such a case I have done as follows: If pinion and wheel run well and round, I break away the upper part, as well as the lower, together with shoulder, enlarge the hole in the pinion, which I place in the universal turning tool, and broach it from below in a conical shape. I next drill a hole in a piece of round steel, suitable for the center staff, take the requisite length, and turn this tube round upon an arbor, approximately suitable, temper and turn it, removing sufficiently to insert this tube one-half into the pinion. I next grip it nicely with fine emery until it fits closely, and then I drive it in firmly, until the shoulder stands up to the pinion.

The hole for the center staff is next broached from above, the upper pivot polished and turned down to the right height. Next follows the turning on of the lower pivot, and the height of the shoulder is regulated in accordance with the quantity required to set the wheel higher or lower. The turning and polishing of the lower pivot ends the work. The operation does not consume any more time than the insertion of a new pivot.

By a precise execution, a turning or displacement of the tube is out of the question, owing to the grinding, and fits so tight as to be removed only by vigorous blows of the hammer. Wheel and pinion run perfectly true, and it will tax the ingenuity of many a workman to decide whether the pinion is solid or simply a tube. It is connected with the additional advantage that, should it ever become damaged at some future time, it is easily repaired in the same manner.—B., in *Allg. Journ. d. Uhrm.*

Workshop Notes.

—An excellent alloy of copper, platinum, and palladium is made by melting for three hours, 9 oz. of copper and 1 oz. platinum, to which some borax has been added as flux; then add 1 oz. of palladium, and continue the heat until the ingredients are well mixed.

—There are many recipes for the making of cold white enamel; it is inseparable, however, from a yellowish sheen by taking simply white color and the usual ingredients. To obviate this, add an atom of black or blue, and the color will at once change to a lively, pure white.

—The analysis of an alloy of a gold ornament found in the grave of an ancient Peruvian Inca, gave, gold, 38.93 parts, silver, 54.82, and copper, 5.80. To check the determination whether this mixture was artificially produced, or obtained by reducing gold ore; it is possible, however, that the form is nearer correct, since the native ones yield a different alloy.

—Watch cases which have been in fire, if gold, are quickly cleaned by being boiled in water, one-half pint, and twenty drops muriatic acid, which leaves the gold pale in color. To restore this, brush with a rather stiff brush and a thick batter of tripoli and oil, carefully, however, not to attack the ornamentation of the case. If silver, red-heat and boil the case until white, then brush with sand.

—One of the best methods to reduce chloride of silver to the metallic state is in use in the mint at Paris; it consists in mixing five parts of dry chloride of silver with one part of freshly burned lime, and to melt it. The chloride of lime thus formed melts easily, without rising in and running over, or adhering to the crucible, which takes place by almost every other method, and produces a loss of silver.

—I was asked by an artist, who desired to "niello" silver porte crayons, what mixture was best suited for the purpose. I had heard that a mixture of the sulphates of silver, antimony and arsenic were used, and I gave him the names of these ingredients, with, however, no result. I next tried the sulphate of silver and antimony, of silver and arsenic, of lead and antimony, in equal parts, and used the antimony and silver separate, with no better results. I next tried sulphur of lead, and obtained a perfect niello.—A. LEVOY, *Revue Scientifique*.

—To clean casts of gypsum (plaster of Paris), has reliefs, etc., which have stood for a long time and become dirty and dusty, several methods are employed, all of which, however, tend to injure the sharp corners of the cast, and occasion loss of time. The writer was called upon to do much of this work, and he hit upon the following excellent expedient: Boil of starch a thick paste, and spread it over the article to be cleaned, with a soft brush. Expose it to an airy place, and when dry, the paste will peel off, together with all the dirt and dust, and the cast will appear as white as when new.

—Nothing is better for cleaning silver than the following: Boil one ounce of finely pulverized tartarshorn in one quart of water. Leave the vessel on the fire and put all the silverware into it, as much as the water will accommodate; let it boil for a time, take it out, drip it over the vessel, and let it dry at the fire. Continue until every article has been treated thus. Next place clean linen cloths in the water, and let them become saturated. When taken out and dried, water, and let them become saturated. When taken out and dried, use them for polishing the silver, (and they are at the same time excellent for cleaning articles of brass—signs, door knobs, etc.). Rub the ware with the cloth, and finish with soft leather.

TO PROTECT METAL WARES—Polished articles of iron, steel, bronze, or brass, are best protected against rust or dimming by polishing them with joiner polish and linseed oil, in the same manner as joiners polish wood. This procedure is adapted for all manner of highly polished metal wares, and especially for piano strings. The knack is easily learned. If a little saltpetre is added for brass, it will receive a gold-like appearance. This must not be mistaken for the common way of "varnishing," by means of a brush. The inequality of such a coating is always disagreeable to the eye, while the other manner cannot even be recognized by expert eyes.

—Cheap muffles for cupellation may be made of two graphite crucibles whose mouths are so smoothly ground that one placed inversely upon the other, forms the muffle. The mouth of the upper crucible is cut out cupelli-form, for purposes of draught and observation; and a hole is bored through its bottom, into which an exit tube is placed. The lower crucible is placed upon the grate, filled nearly full of sand; upon this is placed the small cupel with the alloys to be operated upon. Cover it with the second crucible in such a manner

that the sideward cut directly fronts the furnace door, and when bare at a red heat, open the door, remove the charcoal from the front of the mouth, thereby creating a draft, and a quick oxidation of lead will ensue.

—There are many soft lead alloys composed of tin and bismuth. The softest one is ascribed to Sir Isaac Newton, and contains 8 parts Bismuth and 5 lead, to which 3 parts tin are added afterward. A alloy is produced from this which melts at 77° Cels., and is much used for necklaces, tea and soup spoons, etc., and which, when inserted in a very hot fluid—coffee or tea say, boiling hot, melt, and the astonished victim remains with the handle in his hand. Other soft alloys are composed of 1 bismuth, 1 lead, 1 tin, melts at 99° C.; 1 bismuth, 2 lead, 2 tin, 116° C.; 1 bismuth, 3 lead, 3 tin, 124° C.; 1 bismuth, 4 lead, 4 tin, 138° C.; 5 bismuth, 3 lead, 2 tin, 167° C.; bismuth 2 lead, 2 tin, boiling water in lead, tin, 136° C.; 1 lead, tin, 151° C.; 1 lead, 6 tin, 155° C.; 4 lead, 1 tin, 207° C.

NIELLO—ITS COMPOSITION.—The traveler will have seen in Russia and Persia much silverware beautifully engraved and filled with niello, giving the article the appearance of a black copper plate. The ornamentation, which produces an agreeable contrast, is made in the following manner: Take 2 oz. silver, 5 oz. copper, 7 oz. lead, 24 sulphur, and 5 oz. sal ammonia. Commence by forming a dough of the flour of sulphur, and put them together in a furnace, heat the metals, and pour them in a state of fusion upon the sulphur dough and instantly cover it, to prevent the sulphur from igniting. N calcine this mixture in a melting fire, until the superfluous sulphur has been driven off. Coarsely powder the mixture, with a solution of sal ammonia work it into a dough, which rubs into the engraving upon the silverware. This is cleaned, introduced into a furnace, heated until the dough melts and adheres to the silver. Next draw the ware with a solution of sal ammonia, put into a furnace and muffle, and heat to a red heat, (do not forget, however, that it melts a little above red heat, 20° Wedgewood's pyrometer), engraved surface, which has become, as it were, an alloy, is rubbed and polished, and no fear need be entertained that it ever looses again.

—The favorite black tone, the so-called oxidizing on silver, is induced in different ways, either with chlorine or sulphur. The latter gives a bluish black, the former a brown tone. If a deeper black desired upon the finished article, either of silver, bronze, brass copper, and silver plated, I use sulphuret of potash (liver of sulphur) which I dissolve in distilled water and warm a little; if the tone desired to be more of a brown, I use sal ammoniac and solution of iron in equal parts, dissolved in vinegar.

But the easiest method, and sufficient for common demands, is rub the article to be colored with sal ammoniac, and the black is immediately produced. Should a larger surface become sooty or uneven in color, brush it with graphite.

Mr. Kamarsch says, in order to coat silverware with a dark color, and to produce the so-called oxidized silver, immerse the article in a solution of potash and water, to which add a little sal ammoniac; the desired color is produced, rinse in clean water, dry and finish polishing, which, with sufficient care, may be done. The thus produced grey color forms a very pleasing contrast for articles which are partly gold or gilt.

SILVERING.—An old practitioner requests the *Revue Chronom.* (Saurier) to publish the following recipe for the benefit of his workers: He first enumerates the difficulties encountered by heating an article for resilvering, being soldered with tin, etc., which sometimes renders a heating downright impossible, in order to burn off any matter, and says that "after eight years of experimenting, I have conquered these difficulties at last by the following procedure: Wash the fatty piece in prepared water used by painters (caustic potash). Rinse in clean. Thereupon plunge the piece to be silvered into bath composed of one part sulphuric acid and 10 parts water; rinse in clean water, dry and pass emery paper No. 20, or 30, over it. The piece is then ready for the silvering bath. At the end of one hour withdraw and scratch-brush it, then put it back and withdraw it again at the end of one hour; scratch-brush anew, and return into the bath for another hour, which makes 2½ hours in the bath. Rinse and pass it through a mixture of one part sulphuric acid to 10 parts water, and wash the piece again; it should now be as white as snow, and ready for the burnishing. This is the treatment of the piece itself. As for the pile, an ordinary Bunsen is enough.

I have substituted nitric for muriatic acid in porous vessels of the pile, with complete success. This is the secret of silvering or resilvering without heating."

What is Going On in the Trade.

lished brass goods are again in popular favor.
Diamond collar buttons are now worn by ladies.
Tortoise shell ornaments are never out of vogue.
The eagle's claw is again a fashionable ornament.
Feather fans have butterflies and bees upon them.
Cut onyx beads are worn as bracelets by ladies in mourning.
Antique heads, with jeweled eyes, are the clasps for bracelets.
Ladies' rings have the stones set round the finger, instead of lengthwise.
Enormous straw fans, ornamented with flowers, are all the rage for evening use in London.
R. H. Kirby has bought the bankrupt stock of A. H. Miller, of Chicago, and is selling it at retail.

Rhine crystal lace-pins, combs, and bracelets retain their place among fashionable ornaments.

J. W. Schuckers, of Massillon, Ohio, has sold out to Otto Uhlendorf, who will continue the business.

It is more fashionable this season to set diamonds in combination with dore stones than by themselves.

James F. Vanderveer's jewelry store at Red Bank, N. J., was destroyed fire December 23rd. Loss estimated at \$1200.

G. Fuller, formerly with Bliss Bros. & Everett, has made an engagement to travel for Howard & Scherrie, for the current year.

A French, a well known jeweler and auctioneer, has permanently located in San Francisco, where he is engaged in the jewelry business.

ink, blue, and vari-colored sapphires are being brought into notice by a recent discovery in the mineral regions of North Carolina.

Alton Kohler, of Foneroy, Ohio, is having a very successful auction sale or the management of J. M. Rutherford, the well-known jewelry auctioneer.

elicate medallions in the Sevres or Dresden style, laid over the quartz blue patterns of Chinese vases, tea-sets, etc., are the newest things in mics.

he Mint has lately received large orders for perfectly new ten-cent pieces used for "bangle" purposes, and has been unable to fill them, there being none on hand.

Ir. N. Taylor sailed for Europe in the Bothnia, December 28th, in search of novelties for the spring trade. Messrs. Taylor & Bro. have opened a new establishment in London.

Gold, pearl, silver, jet, coral beads and delicate gold chains passed several times around the neck are worn as necklaces, but they are all worn close round, not falling on the shoulders.

Miss Annie Louise Cary owns one of the most perfect emeralds in the world. It weighs twenty-three karats, and is valued at \$50,000. It was found at the sale of Queen Isabella's jewels in Paris.

Sam Kidd, a jeweler of Cleveland, committed suicide December 21, by jumping from the roof of his house. He had been drinking heavily for some time previous to the commission of the fatal act. He leaves a family.

France a pearl costing \$16 is now initiated for 50 cents or \$1, and so successfully as to be sold at the price of the genuine article, to anyone not a trifle expert, and even the latter class are often puzzled.

Among handsome and costly new jewelry lately brought into notice is a pair of fine green rutile found in North Carolina. It is paler than emerald, but very brilliant, and of the same rank in hardness among jewels as the apatite.

W. & S. Blackinton's building at Attleboro, Mass., was destroyed by fire in the morning of the 27th ult., their loss to stock, machinery, etc., is estimated at \$60,000. E. A. Robinson, and Harris & Fisher, jewelers, were also heavy losers. They are, however, thought to be fully insured.

In the recent series of watches at Montreal, it was found that an official of the Pullman Palace-Car Company was implicated, and it is believed that the officials of the railway companies running between Canada and the United States, are parties to transactions of a similar character.

Hagtor & Thorpe were awarded a Medal of Merit at the Atlanta Exposition, for their well known Bess Improved Patent stiffened gold watch cases. The merit of these goods is fully appreciated; they sell readily, and give entire satisfaction. A written guarantee by the manufacturers is given in each case.

Henry Abbott, the inventor of Abbott's patent stem winder, has issued a very attractive lithographic card, representing the burial of the old key winders, while the new stem-winding device appears as a brilliant sun, illuminating the horological surroundings. The card is ingenious in design and brilliant in its execution.

Pierre Auborin, a Swiss watchmaker, was recently found hanging to a tree in the Hoboken marshes. The deceased had no relatives or friends in the country, and had been without work for several weeks. From letters at his home, it was ascertained that the dead man leaves a wife and children in Switzerland.

A clerk in a Cincinnati store, in attempting to remove some goods from a show window by means of a brass rod, one evening recently, accidentally touched an electric light wire, and received a shock that threw him headlong through the plate glass to the pavement. His face was badly cut, but he was not permanently injured.

Albert H. Potter & Co., of Geneva, Switzerland, have just introduced into this market a new anchor movement. Any production of this well known firm may be safely estimated as combining attractive qualities with excellent workmanship. Mr. Potter is acknowledged to be one of the most skillful horologists, not only in this country, but in Europe.

We regret to learn that Mr. H. Hurlburt, of the Hurlburt Manufacturing Company, lost his only son during the past month, from typhus fever. The lad was a boy of great promise, intelligent and affectionate, and his loss is a terrible affliction to his parents. The sympathy of the trade will go out to Mr. Hurlburt and his family in their severe bereavement.

The custom house guards of Buenos Ayres had a fine catch the beginning of October among passengers by the Europa, from Rio de Janeiro. They relieved of one hundred and nineteen watches, eleven bracelets, and twenty other articles of jewelry, ingeniously disposed in pockets in her inside clothing and in the upper part of her stockings, and supported by suspenders.

W. N. Doynton, chairman of the executive committee of the Iowa Retail Dealers' Association, has issued a printed address to the Iowa dealers, urging them to become members of the Association, and pointing out the many advantages already secured to retail dealers by combined action. He especially calls attention to the importance of a uniform tariff for bench work.

A few days since a sneak thief entered the store of L. F. Cahn, in Maiden Lane, and asked to be shown some gold chains. While he was examining them, he suddenly seized two chains and made off with them. He was pursued and finally caught, but as the goods were not found on him, he is supposed to have passed them to a confederate. He was held for examination.

At the holiday season there always springs up in large cities and villages, a lot of mock auctions and dealers in cheap jewelry. The goods they handle are essentially of the "skin" order, having so little value in them that it is imperceptible. The law should be invoked to protect the public from these knaves, for they live by misrepresentation and fraud. Every one of them is liable to criminal prosecution for obtaining money under false pretenses.

A portion of the crown jewels of France are to be sold at public auction. It is proposed to retain an assortment, including certain presents from foreign monarchs, and a sword valued at 250,000 francs, and possessing artistic value. The Committee are also disinclined to sell the Regent diamond, fearing it would be bought by enterprising Americans for exhibition. They are in favor of disposing of diamonds to the value of 12,000,000 francs, possessing no historical value.

Patti's diamonds have attracted a good deal of comment, and the bulk of her fortune is said to consist of them. She wears at her concerts half a million in these precious stones. In quantity the number is not amazing, but the size and purity of the gems are wonderful. The necklace she wears is made of stones big enough to be called barbaric, set in silver in such a way that the metal does not show, and closely linked. When she sings, the glittering gems quiver and throw out such rays of white fire and light that the eyes are dazzled.

A certain class of Providence and Attleboro drummers for manufacturers of cheap goods, after stocking up the jobbers to their full capacity, have been selling to the small retail trade at jobbers' prices. This has a tendency to depreciate the entire stocks of retail dealers, and besides robbing the jobbers of the patronage that should belong to them, has also engendered much ill feeling between retailers, resulting from the active competition and cutting of prices to which it has given rise. Jobbers should remember these firms in their cure dealings.

The extraordinary transactions of Wm. Nichols, of Toledo, Ohio, have excited considerable indignation in the trade. He enjoyed the confidence of the trade to a considerable extent, and had obtained a large quantity of goods on credit. On the 19th of November he transferred his entire stock, which he valued at \$10,000, to one Dudley M. Keen, who is reported to be an auctioneer of job lots of merchandise, and who is in the habit of buying up the stocks of parties in trouble. Keen claims that he had been carrying Nichols for three years past, and had become surety for him for about \$10,000, and that Nichols owed him \$10,000, about \$5,000, and that he paid Nichols cash, \$3,800, making 75 per cent. of the value of the stock. Creditors to the amount of \$12,000 and upwards have attached the stock, and Keen, claiming ownership under bill of sale, has sued the sheriff. Unless creditors can prove fraud or collusion between Nichols and Keen, they will probably realize nothing on their claims.

E. C. Holbrook, traveler for the Whiting Manufacturing Company, while at Racine, Wisconsin, recently, had his sample trunk stolen from the depot. The trunk had been checked for as baggage and for value. An expert thief, having the appearance of a traveling man, succeeded in removing the checks from the trunk, and then, just as the train was about to start, rushed up to the baggage master, claimed Holbrook's trunk, and had it rechecked to Chicago. During this secured a check for the trunk, he had no difficulty in obtaining possession of it at Chicago. A detective from the Island House in that city, where it was found despoiled of its contents, valued it at \$4,000 to \$5,000. As the railroad company had issued checks to Holbrook to the managers of the loss, it is, of course, responsible for the loss. The case is now in the hands of the Jewellers' Protective Union, and if the thief will consent to be Pinkerton's Detective Agency, he will probably hear of something at least conducive to his morals, if not to his immediate personal advantage.



ARTOTYPE

E. BERNSTADT, N. Y.

GROUP OF
STERLING SILVER WARE BY THE
GORHAM M'FG CO.

GORHAM MF'G COMPANY,
Silversmiths.

37 UNION SQUARE, NEW YORK.

170 State Street,
CHICAGO, ILLS.

120 Sutter Street,
SAN FRANCISCO, CAL.

FACTORY:
PROVIDENCE, R. I.

ON THE preceding page we present an ALBERTYPE GROUP, showing examples of our Later Productions in Hollow Ware, designed to Illustrate the Different Varieties of Decoration, rather than to show our Most Expensive Wares exclusively.

Our Stock always contains an Assortment of this Class of Goods, and Customers who cannot carry such goods in their stock continuously are often enabled to effect Large Sales by availing themselves of the privilege we extend them, of sending this class of Wares for their approval or selection.

Gorham Mfg Company,
SILVERSMITHS.